APR 13 1922

GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CLVII. No. 3072.] LONDON, MARCH 29, 1922. [74TH YEAR. PRICE 1s.

OXIDE OF IRON
SPENT OXIDE

GAS PURIFICATION AND CHEMICAL CO., Ltd.
PALMERSTON HOUSE, LONDON, E.C.2.
Telegrams: "PURIFICATION, LONDON."
Telephone: 9144 LONDON WALL.

B. 290
Aluminium
Sheets, Circles, Tube,
Wire, Strand,
Rod, Bar,
&c.
BRITISH ALUMINIUM CO., LTD.,
109, Queen Victoria St., London.

R. & W. HAWTHORN LESLIE & CO., LTD.
In Stock.
TANK LOCOMOTIVES
Always in Progress.
Locomotive & Marine Engineers & Shipbuilders,
NEWCASTLE-ON-TYNE.

"TORBAY PAINT"
FOR ALL PURPOSES.
The TORBAY PAINT CO.,
26/28, Billiter St., LONDON, E.C.
39/41, Old Hall St., LIVERPOOL.

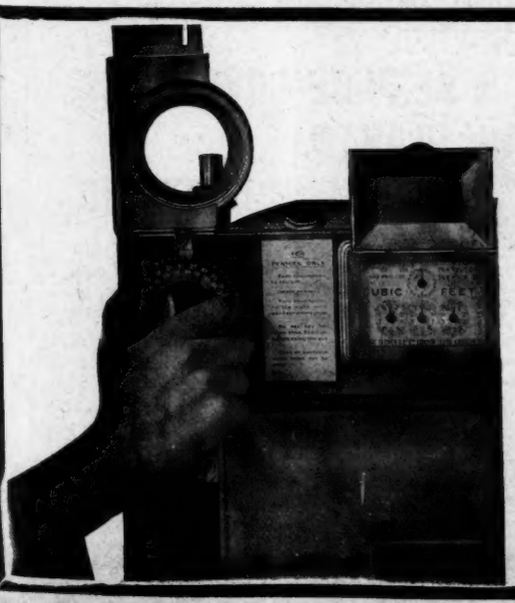
BUY YOUR
COKE SACKS
Direct from the
WEAVER & MANUFACTURER
HERBERT POCOCK
PARK MILLS,
SALISBURY.
ESTAB. 1778.

INTERMITTENT
VERTICALS.
Adopted all over the World.
Vertical Gas Retort Syndicate LTD.,
17, VICTORIA ST., WESTMINSTER, S.W.
Sole Agents for Australasia
JAMES HURLL & CO., LTD., SYDNEY.

W. PARKINSON & CO.
(Incorporated in Parkinson and W. & B. Cowan, Ltd.),
LONDON & BIRMINGHAM.
(See Advertisement p. 746).

JAMES McKELVIE & CO.
Coal Owners,
Gas and Steam Coal Contractors,
17, RUTLAND SQUARE, EDINBURGH.
59, MARK LANE, LONDON, E.C.
GUILDHALL CHAMBERS, SANDHILL,
NEWCASTLE-ON-TYNE.
24, CHAPEL STREET, LIVERPOOL.
ESTABLISHED 1846.

STEWARTS AND LLOYDS, LIMITED, 41, OSWALD STREET, GLASGOW. BROAD STREET CHAMBERS, BIRMINGHAM.
TUBES & FITTINGS for Gas, Steam, Water, &c.



George Glover's New
"Ranelagh"
Price-changer Pre-payment Gas Meter.
After the insertion of the coin, turning the handle automatically closes the slot. It is thus **impossible to obtain unpaid-for gas.**
GEORGE GLOVER & Co., LTD.
Ranelagh Works, Royal Avenue, Chelsea, London, S.W.3.
Branches: 9, Dewsbury Rd., Leeds, & Gaythorn Meter Works, Manchester.

Costs by using PERMUDUK ELASTIC PAINT twice as long as other Paints.
GRIFFITHS BROS. & CO. (LONDON), LTD. BERMONDSEY, LONDON, S.E. 16.

J. & J. BRADDOCK

(Branch of Meters Limited),

GLOBE METER WORKS,

Telegrams: "Braddock, Oldham." Telephone 815.

OLDHAM,

AND

45 & 47, WESTMINSTER BRIDGE ROAD,

Telegrams: "Metrique, Lamb London." Telephone 2412 Hop.

LONDON, S.E. 1.

MANUFACTURERS OF HIGH-CLASS

GAS STATION METERS.

BRADDOCK'S

STATION GOVERNORS

AND

RETORT-HOUSE GOVERNORS.

IMPROVED

WET & DRY GAS METERS

OF BEST QUALITY.

BRADDOCK'S PATENT

"SLOT" METERS.

FULL PARTICULARS ON APPLICATION.

RETORTS.

From one of the best known Gas Engineers in the country: "I find your Retorts more suited to the present-day conditions than any I have obtained elsewhere."

Write or 'Phone:

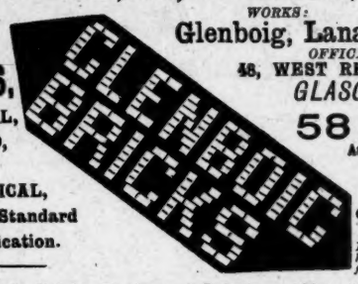
WILLIAMSON, CLIFF, Ltd.,

Gas Retort and Fire-Clay Works,

STAMFORD. Telephones—16 Stamford. 1771 Avenue.

THE GLENBOIG UNION FIRE-CLAY Co. Ltd.

GAS-RETORTS, HORIZONTAL, INCLINED, and VERTICAL, to New Standard Specification.



WORKS: Glenboig, Lanarkshire.

OFFICES: 48, WEST REGENT ST., GLASGOW.

58 FIRST AWARDS At International and Home Exhibitions, including Grand Prize at Brussels, 1910.

In every case the highest award given for Fire Clay Goods.

The Glenboig Bricks, Blocks, and Retorts combine, in the highest degree, the qualities of not melting, and not splitting, when subjected to the highest heats and sudden changes of temperature, and are, in consequence, found to be economical, even in districts where the local bricks can be had at half the price.

B DONKIN D

RATEAU TURBO GAS EXHAUSTERS

ALSO FOR

PRESSURE RAISING & COMPRESSING.

Manufacturers under Licence from Professor Rateau.

WE HAVE SUPPLIED AND HAVE ON ORDER—

ONE HUNDRED AND THIRTEEN MACHINES.

Total Capacity: **54,338,000** cubic feet per hour.

MAKERS ALSO OF

VALVES of all Sizes & Types (Air & Gas) and for High or Low Pressures. **DISTRICT & SERVICE GOVERNORS.**

HIGH PRESSURE GAS PLANTS.

GAS EXHAUSTING PLANTS TO SUIT ALL CONDITIONS.

VALVES for COKE OVENS a Specialty. GLAND PLUG COCKS.

THE BRYAN DONKIN CO., LTD.,

Engineers and Ironfounders,

Head Office and Works, CHESTERFIELD.

London Office: 3, VICTORIA STREET, WESTMINSTER, S.W. 1.

Chesterfield Telephone No. 84. London Telephone No. 5353 Victoria.

Chesterfield Telegrams, "Donkin Chesterfield." London Telegrams, "Donkin Vic. London."

B CHESTERFIELD D

GAS JOURNAL

LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

PROPRIETORS: WALTER KING, LIMITED. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

Telephone: Holborn 6857. —— Telegrams: "GASKING, FLEET, LONDON."

VOL. CLVII., No. 3072.] WEDNESDAY, MARCH 29, 1922. [74TH YEAR.

EDITORIAL NOTES.

Under the Gas Regulation Act.

WE are not attempting to review nor to comment upon the vast scope of the address with which Mr. J. M. Campbell, of Margate, inaugurated his year of office as President of the Southern Association of Gas Engineers and Managers. It was a remarkable address in many ways. There is not only a great variety of topic in it, but there are experiences of a highly special nature, owing partly to wartime conditions, which were in the case of Margate accentuated by the constant and inconvenient bombing attentions of the enemy. These proved to the Gas Company, if such drastic proof were necessary, that their employees (as the President indicated) were of the right mettle, and that their Engineer and Manager (as he did not indicate) possessed abundantly the same quality during that trying period, when responsibility was a heavy load. Had it not been for their superlative loyalty to duty, Margate would have had added to its disconcerting happenings of war time the deprivation of a supply of gas. Such gas-works as those at Margate and Ramsgate stood (so to speak) at the very gateways to intrusion over this country by aerial bombers; but those who manned those works stuck to duty with a tenacity that exceeds all power of praise. When opportunity arises (as it does this week), it is right the fact should be remembered.

However, regarding the address, as Mr. A. E. Broadberry said, in proposing a vote of thanks to the President for it, it was full of ideas, full of energy, and full of ability. He also said that in places the President had been bold. This is not a bad characteristic—in fact, it is expected—in an engineer with initiative and originality in his mental composition. But the suggestion as to boldness indicates also controversial topic, or differences of opinion, here and there. The address is also highly informative, particularly in the part in which Mr. Campbell has been making a study of issues from, and conditions arising as a result of, the Gas Regulation Act. We agree with him—and most men qualified to express an opinion will do so—that a new era has been inaugurated by the Act, and that the opportunities created by it give rise to the certainty that history during the coming years will be distinctly made by progressive and enterprising engineers, unless curtailed by some such mischievous attitude as was recently adopted by certain persons and newspapers in respect of carbon monoxide. We feel a fair amount of confidence that those who have been indulging in mischief-making will not succeed in obtaining their objective; and therefore there is not the slightest doubt in our minds that the intuition and prescience that underlay the conception of the therm basis of working and charging and the declaration of calorific values according to general and geographical economic conditions will be fully rewarded by development in the impetus to new invention and the realization of larger efficiencies in gas production and use. This is the opinion of some of the most sagacious of our leaders in the gas industry.

One of the greatest errors in modern gas thought is found where there is belief that the new therm basis is exclusively confined to the fixing of charges as between gas seller and gas buyer. It is nothing of the kind. Those who think so should make a more extended study of the Act, and ascertain this for themselves. They will find that in every part it favours a wider outlook upon possibilities, and that it gives new scope, through revision. What is thought and done under present-day conditions we are at liberty, through the powers that the Act confers, to have revised under the conditions of to-morrow. There are those who would curtail this liberty by interposing something not originally contemplated by the Bill that resulted in the Act. They have on more than one occasion ruffled the new calm of the outlook that the Act gave the industry. The last effort was unfortunately accompanied by incidents—some of them no doubt induced by the publicity and the suggestion—which we all deplore, but which in the main did not by an iota alter the attitude that the gas industry has taken up in this particular relation. When occasions such as this arise, it seems to the President that some official pronouncement should be made immediately on the industry's behalf to allay suspicion, dispel doubts, and answer the charge. The matter in question was so taken up, and promptly; but there are occasions when official representations from an industry such as ours are looked upon by the public as somewhat suspect, and not altogether free from self-interest. This is an advantage on the side of the attackers; and therefore ways and means ought to be found for dealing with such questions authoritatively and quickly by more or less independent men who command public respect. In this instance, however, the lead given to an hysterical and sensation-loving Press did not do much harm among the public, who see things in a more practical light than some other people whose aim is agitation. There has been no agitation on this occasion. The public say (we have heard several disinterested men say) if people will be such fools as to wish deliberately to take their lives, they will do it by one of several means; and, separating these from the rest, the accidental cases are but few. At the same time the President urges that there should be no loss of time in giving attention to reported leakages. No one will disagree with this; and we would go beyond that and say, if there is negligence in this matter, there ought to be punishment for the person responsible.

Further arising from the Gas Regulation Act, is the examination that Mr. Campbell has made of the additions to the old standard gas prices converted to the therm basis at 500 B.Th.U.; and he has tabulated the results. The highest addition made has been 12·2d., and the lowest 3·2d. Of the total number of undertakings dealt with—199—the greatest number have had their standards raised between 7·2d. and 8d. per therm. Exceptional circumstances have received exceptional treatment. Among the exceptional circumstances have been location, and standard and maximum prices that time has shown were somewhat higher than pre-war circumstances actually required. In such cases there was less need for a large addition. Like many other men who are qualified to form judgment, the President is satisfied with what has been done. "Examination "of the tabulated figures," he says, "very clearly testifies "to the extraordinary care that has been bestowed upon "each application by the Board of Trade, despite the enor- "mous number showered upon them, and the vast amount "of investigation involved." There is incidental reference to some fear that there may be an attempt in the near future to effect adjustments in the standard or maximum prices per therm allowed in the earlier issued Orders, owing to the reduction of expenditure compared with the expenditure levels ruling at the time the Orders were made. We do not think there is danger of any such thing. The Board of Trade have to take the whole of the conditions, and not part of them, into consideration. This is clearly demonstrated by the fairly consistent relationship that there is between the standard prices made in recent Orders and those granted in the earlier ones. Expenditure has been somewhat reduced, but secondary products have lost much of the revenue-earning power that they possessed in 1915

and 1920. There are few companies who have through the circumstances of the last year or two, notwithstanding the operation of the therm system, been able to restore to their proprietors the rates of dividends paid before the war, and such restoration is one of the objects—and it is a just object—of the Gas Regulation Act. Furthermore, economic conditions have so changed that some of the pre-war rates of dividend do not look like causing a recovery of stock and share market values to pre-war levels. These are all considerations. And we do not think there will be any overhauling of decisions already made until undertakings are individually before the Board of Trade.

In this connection the President very pertinently pointed to the position of those gas companies who hold annual meetings, but whose statutory enactments prevent them paying, though a reduction in the price of gas is made during part of a year, any higher dividend for that part than is allowed by the highest price charged during the year. In this condition, there is no incentive to make a reduction (other than that of increasing the volume of business) until the beginning of a dividend year. Even the temporary denial of benefit to the proprietors is a mistake. It is not the case under modern legislative conditions. But it does exist in places; and Mr. Campbell is of opinion that the anomaly might be redressed by representation to the Board of Trade. As the anomaly does not generally exist, we do not think that any good would result from representation to the Board. Where it exists, it is due to specific enactment in Special Acts; and every company with the restriction upon them can get it amended when making fresh application to Parliament, or when applying for a Special Order through the Board of Trade.

There is interest, too, in the President's investigation into the calorific powers that have been declared. Out of 190 undertakings, he finds that a calorific value of 450 B.Th.U. has found the largest number of adherents. The declaration of that figure has been made by 66 concerns. A value of 460 B.Th.U. has been declared by 22; 470 B.Th.U. by 20; 475 B.Th.U. by 17; 480 B.Th.U. by 18; 490 B.Th.U. by 2; and 500 B.Th.U. by 29. There are only five undertakings above 500 B.Th.U.; and eleven below 450 B.Th.U. Two have declared 400 B.Th.U.; one 410 B.Th.U.; one 420 B.Th.U.; six 425 B.Th.U.; and one 430 B.Th.U. The President is rather surprised at the number of small companies that have declared 450 B.Th.U., though many of them, he believes, are only making coal gas. One of the things that does not surprise us is that so many moderate sized undertakings have adopted small water-gas plants, and, in cases where there have been difficulties with coal and secondary products, complete gasification plants.

All the President has to say about his working of the Woodall-Duckham vertical retorts—with which he finds no difficulty in carbonizing Durham coal, but which at the date of their installation were not arranged for steaming, though he has managed a limited amount—must pass, with the one remark that reconstruction is now proceeding which will enable Mr. Campbell to get the full effect from steaming. Economies, wartime experiences, and many other matters command interest, and will well repay perusal. Here, however, we must leave the address, with the expression of our opinion that the compliments paid to it and its author were wholly deserved.

Meter Inspection Efficiency.

In the gas-trading system, the meter surveyor or inspector is an important individual. His work is entitled to the same adjectival description. Upon accuracy and conscientiousness in the performance of the duties of the meter inspector depends the avoidance of some considerable trouble with the consumers in respect of their accounts. But the meter inspector is not always treated in a manner (this is not deliberately done), nor is his work always arranged, to ensure that the greatest efficiency is obtained in that department of an undertaking's operations. A paper by Mr. G. D. Alexander, of Glasgow, before the Scottish Junior Gas Association (Western District), gives in succinct form the experiences of a practical man in a large undertaking. The conditions in small concerns are, of course, somewhat different; but, nevertheless, even the managements of small undertakings we think may learn something from the paper. The subject is one which has been kept rather in the background of the deliberations of our technical organizations; and so some good may result from this reference. When the contents of the contribution are carefully examined, it is found that its essence is compounded of two parts—first, that the highest efficiency and benefit to an undertaking in the meter survey department should be sought by training inspectors to be of the maximum use, and that the highest economy should be obtained by applying the best methods and providing the best facilities for the conduct of the work. At one time, in many undertakings the idea was prevalent that any man who could be taught to read a meter-index, and register what it told him in a book and (if in use) on a meter-card, was sufficiently qualified to be a meter inspector. But Mr. Alexander is not of this way of thinking. To hold that opinion, and so to limit the functions of a meter inspector is to waste a large amount of latent energy if intelligent men are employed. It is work in which, in the interests of a gas undertaking, the best practicable men should be employed.

We are quite in sympathy with Mr. Alexander's views in this connection, because we do not believe in wasted energy, talent, or opportunity; and there is that waste where there is strict limitation of the duties of men representing a gas undertaking, and coming into direct contact with customers. We know the old-fashioned idea that meter inspectors, if they heard of a complaint, should report it to headquarters, and keep silent themselves, while if they were qualified to give a word of advice, the circuitous course could often be avoided, and satisfaction could be realized in perhaps a couple of minutes. Meter inspectors have a right of entry at reasonable times into consumers' houses. Consumers will talk to them; and a courteous meter inspector will soon make friends. Having done this, what is more natural than that he should be asked questions about gas and gas appliances? He cannot avoid this; and there is no reason why he should. The consumer is the inquirer. Being on fairly intimate terms with the consumers, he can be of more use to a gas undertaking than an official who is a comparative stranger to the consumers. A word of advice or of explanation in season is often beneficial. A competent opinion readily obtained may have an obviating or other useful effect that might not be realized if the consumer is left to take the trouble or to go out of his way to make the inquiry. For all these reasons, Mr. Alexander holds that the districts of meter inspectors should not be periodically changed. There is no justification for such moves; and there is good reason why they should not be made. He would also have the modern meter inspector devote part of his time to study by attending instruction classes, where he can learn of the construction, working, and maintenance of gas-meters and the gas appliances in general use. Through this he will be better qualified to report on the matter if he detects anything wrong in a meter, and not leave its discovery so much to chance; and he will be able to answer questions intelligently and not foolishly, and so give information that will do good and not harm. Gas use has changed in magnitude and variety so much in recent years, and it has all been capped by the advent of the therm basis of working and charging, that the management of a gas undertaking should see to it that there is the maximum qualification and efficiency in every branch of its staff—outdoor as well as indoor, commercial as well as manufacturing. If this is not done, then, as employees and consumers will talk, some injury may be unconsciously inflicted upon the business. Every gas man, whatever his position, who meets consumers should be a qualified missionary and adviser. Men so trained, and who know the district and consumers, would make excellent candidates for higher posts in the gas sales department.

Then as to the principal work of the meter inspector, no standard can be defined that could be universally applied regarding the number of meters an inspector can read in a given time. The density of meters, the character of the dwellings in a district, the location of the meters, and other things all come in to destroy any attempt to standardize the quantity of work an individual inspector can do anywhere and everywhere. It cannot be done. An approximate standard can be fixed for any given district in a large city, but nothing more. What can be done in one district cannot be done in another differently constituted in regard to meter density and location. And as to meter location, if more intelligence were displayed by those who have the choosing of the "sites" of meters, they would contribute considerably to the economy and efficiency of the meter survey; accessibility would save much of the time of the inspectors, and would ensure greater accuracy in their work. But it is a fact that many meters appear to have been placed in

positions to give the inspectors as much worry and inconvenience as possible in the performance of their duties. We are not surprised to find Mr. Alexander protesting against this, and urging greater consideration—not only in the interests of the inspectors, but in those of the undertakings themselves.

As to methods—briefly, in large gas-supply areas Mr. Alexander would have, in addition to assistant chief meter surveyors, a supervisor appointed (say) over every ten districts. He would prefer that the inspector should do his own writing, checking, and passing of accounts instead of deputing the work to a typist. Practices vary; and there will not be general agreement with Mr. Alexander in regard to the duties of the inspector in these respects. He believes, too, in intermediate surveys, in order to check the consumer's consumption. He prefers in the work the use of the card system, instead of the old survey book. Though he admits the card system has its bad points as well as its good ones, on balance it is the superior, and is more elastic. The paper is not long, but it is full of practical points; and it shows that this department of a gas undertaking's work could in many cases be improved with material advantage.

Special Lines.

"THE way to increase business is to go after it." This is one of the axiomatic sentences in the paper that Mr. H. H. Creasey read at the Blackburn Conference of the British Commercial Gas Association last Wednesday. The message of the paper is one to which prominence should be given. It is that there are special lines in the gas business which require special treatment in their development, and which business it pays gas undertakings to get hold of and to keep. Mr. Creasey did not claim that there was anything original about what the Gas Light and Coke Company are doing in this respect. They may have been—they were, in fact—one of the pioneers in it; but other gas undertakings are doing the same thing, or working in much the same way in regard to these special lines. It is some fourteen years since the Company started specializing work by organizing a campaign among the medical profession, who, in those times, had quite a fair representation among those who are ignorant as to what gas can do in heating, and what it does not do, using modern fires, in respect of the contamination of the atmosphere. It was worth while and important to get the medical profession, or that part of it who harboured erroneous notions as to gas, to realize their error, because the members of that profession have very great influence in this regard. Demonstration and experience in their own households have resulted in a wonderful change; and by 1912, a very large percentage of the medical practitioners in the Gas Light Company's area were users of gas-fires. There was during the war a drop in the number, attributable to various causes. Many medical men went to the front, some were killed, some moved out of London, and the Company had to relinquish much of their business-developing programme owing to war conditions in respect of labour, goods, materials, and finance.

In resuming the work, the percentage line of users of gas-fires among medical men again began to take the upward course. Now the data stand as may be seen in Mr. Creasey's paper. The figures are healthy testimony as to what has happened in this one respect. In London, any groundless prejudice there may have been in the medical profession against gas heating has been (one may say) wholly removed by personal experience—personal experience obtained, with set purpose, by activity on the part of the Company and their enthusiastic officers. That activity has spread to other professions—architects among them—and to institutions, such as hospitals and nursing-homes. Success has followed enterprise conducted with diligence and with definite object. It will be little use now for electrical canvassers to talk to the London medical men of the contamination of the atmosphere of rooms by gas heating; it will be little use their talking to those medical men of that marvellous selective process of the gas-fire—a process existing only in electrical imagination—whereby the air of a room is denuded by it of oxygen, and yet the fire pursues its functions and human life continues to exist in that oxygen impoverished air. It is all (as electrically put) very remarkable, and quite opposed to the laws of Nature and the facts of life. Yet there are electrical men who still talk in this way. If they wish to be laughed at, they should visit the medical men with experience of gas heating, and tell them of the fiction, and of the relative number of B.Th.U. they can supply for heating for (say) a shilling. However, what started as a Medical Section of the Gas Light Company's sales operations has developed into a Special Service Section; and each special line of business has its individual campaign, with men specially trained for the purpose. Take, as an example, factories. Well-defined plans are laid down, starting with the initial work of listing all factories. The nature of their processes, and what would be their gas requirements, are then studied, together with the best means of meeting them. Visits are paid; and a large measure of success is achieved, by method and intelligence. Gas-engines also have a special department, which has a system of inspection, and any necessary adjustments are made. When repairs are needed, a specification of the work and an estimate of the cost are forwarded to the user. This has given a great amount of satisfaction, and prevented many a power user drifting into the net of a rival power trader. These are only examples of what is done in special lines and by special system and effort. More detail will be found in the paper, together with the results, which invite those undertakings that are not working in a similar manner to go and do likewise.

Reinforced Concrete in Gas-Works.

INTO gas-works extensions and improvements reinforced concrete is entering very largely. We gave a notable illustration of this when dealing last summer with the enlargements and other changes at the Portslade works of the Brighton and Hove Gas Company. Of course, reinforced concrete is not a new thing in gas-works structures; but, tentatively adopted at first, it is rather noticeable how extensively its use is now growing for large and substantial plant, and for new purposes. In other columns this week, a description is given of the new Glover-West vertical retort installation at Blackburn, which has been carried out to the plans of Mr. G. P. Mitchell, the Corporation Gas Engineer and General Manager. It is a considerable installation—the number of retorts being 96, and the nominal manufacturing capacity 3 million cubic feet per day. In the selection of continuous vertical retorts, regard was had to the elasticity in manufacture which the powers of the Gas Regulation Act confer; and with steaming of continuous vertical retort charges, whatever the physical characteristics of the coal to be carbonized (particularly with the ability to regulate at will the heats at any point in the length of the retorts according to those characteristics), one has the power to vary operations in such manner that a fair consistency in gas result will be realized. The vertical retort installation was, of course, the central feature of the inauguration proceedings last Thursday, as reported in later columns; but it is the reinforced concrete construction, seen and unseen, that is another striking feature. Vertical retorts require solid, substantial, and level foundations—otherwise there will be trouble with the charging and discharging operations through the retorts getting out of "true" in their length. The subsoil on the gas-works site at Blackburn appears to be of a treacherous nature; and so all the main loads of the new plant are carried on piles—no less than 276—which have been driven to depths of 30 to 40 ft. The piles are reinforced in the upper 25 ft., and are connected together by a ferro-concrete raft. One side of the retort-bench is supported on piers of the same material. Incidentally, it may be mentioned that the whole of the foundations and other concrete work are made with a granite aggregate, and in the proportion of 1 part of best portland cement to 2 parts of clean sand, and 4 parts of aggregate. An exception is the coal-breaker pit, which is made in the proportions of 1 to 1½ to 3. There is also a battery of reinforced coke-hoppers, 46 ft. high and 105 ft. long, supported by piles. A crane gantry is constructed entirely of reinforced concrete, carried on piles; and a platform, 5 ft. wide, is made of the same material, monolithic with the structure. This is only another illustration of the growth of the application of reinforced concrete to gas-works construction in connection with modern changes.

Gas-Workers' Wages.

The agreement for the adjustment of wages under the sliding-scale arrangement operates again next Saturday—this time by ½d. per hour; and a calendar month later a further ½d. will be deducted. The reductions will carry appropriate proportionate deductions of the munitions bonus (where applicable) in

respect of workmen of 21 years of age and over. Actually the 1d. could have been taken off next Saturday; but sufficient cause was shown for making the reduction in two cuts.

Gas Examiners for Middlesex.

The Middlesex County Council are not waiting for the General Notification of the Gas Referees (referred to last week) as to the making of appointments of gas examiners under the Gas Regulation Act. An advertisement appears in this issue inviting applications for the positions in the County of Middlesex. Applicants are to have a thorough knowledge of physics and chemistry. The remuneration is to be by way of a fee per test, varying from 8s. to 15s. per test according to the number of tests made per week. The examiners will not be required to devote their whole time to the duties of the office.

Meter Unions.

The meter makers have agreed to fit meters with any size unions that individual buyers may require.

Meetings and Gas Engineers.

The tax upon the time of gas engineers in attending many meetings, through the multiplicity of organizations, was a point in the Presidential Address of Mr. J. M. Campbell to the members of the Southern Association last Thursday. He thinks that, now the several central bodies are housed under one roof, perhaps some co-operation might be secured, so that the meetings are better co-ordinated than in the past, and thus economize time. He suggests that a permanent Joint Committee of Secretaries could be formed to deal with the question.

Sulphate of Ammonia.

Last week there was intimation of a pressure for sulphate of ammonia to satisfy home requirements. We see from the Board of Trade returns that exports are not this year so high as they were twelve months ago. In February, the shipments were 11,751 tons, compared with 13,478 tons in February, 1921. Taking January and February together, the amount exported was 28,605 tons, compared with 33,694 tons in the same months of last year.

Cost of Coal Control.

Among the estimates for 1922-23 for unclassified services is a sum of £5,000,000 in respect of coal mines deficiency—this amount representing an increase of £2,000,000 on the total voted for the current financial year. The net cost of the statutory control of coal mines is now estimated to have been £34,250,000, apart from the mining industry subvention, which amounted to £7,100,000—together £41,350,000. This does not include the losses to the country due to mistakes in control.

Gas Coal Exports.

Gas coal exports are still leaping up. In the first two months of this year, they more than doubled the shipments for the corresponding months of last year. In February, 518,132 tons were shipped, compared with 291,907 in February, 1921, and 196,635 tons in February, 1920. The value of the 518,132 tons shipped last month was £567,168, or £1 1s. 10·7d. per ton. Taking the two months January and February together, 1,109,855 tons of gas coal were sent abroad, compared with 502,142 in the corresponding period of 1921, and 458,818 tons in that of 1920.

Gas Coke Shipments.

The quantity of gas coke exported in February was 82,568 tons, of a value of £127,586, or £1 10s. 10·8d. per ton. In February, 1921, the quantity was 71,862; the value being £179,867. In February, 1920, 80,320 tons were sent abroad; the value being £376,416. Thus gas coke sent abroad is now only fetching about one-third of the price that it was in the corresponding period of 1920. In January and February, 150,277 tons were exported, compared with 103,481 tons in the same period of 1921, and 160,673 tons in the first two months of 1920.

Road Transport.

An attempt is being made by the London and North-Western Railway Group to obtain statutory powers to run transport by road independently of rail. Through the Federation of British Industries, a long and strong protest has been made against this by traders. We cannot enter into the argument in detail. But it is evident that traders want road transport to be free and unfettered, and conducted on absolutely competitive lines. They are apprehensive that, if the railway companies are granted these powers of road transport, they will (if they desire to make this branch of business profitable) be driven by circumstances to attempt to obtain an effective control of the road transport system of the country—in other words, they will try to secure a monopoly by fierce competition with existing carriers by road. There is no doubt the railway companies are beginning to feel the effect of road transport. It is, however, to be hoped that it will be left free, so that competition will continue between road and railway carriage. Users of the railways for goods transport are already very heavily handicapped by the rates they have to pay.

Domestic Smoke Abatement.

It was an interesting interview that a deputation organized by the Coal Smoke Abatement Society had recently with Sir Alfred Mond at the Ministry of Health. Several organizations concerned in the subject of air sanitation were represented—among them being the Institution of Gas Engineers, the Institution of Electrical Engineers, the British Commercial Gas Association, and the Electrical Development Association. The speeches made by members of the deputation (which was headed by Sir Aston Webb, President of the Royal Academy) were directed largely to the question of domestic smoke. Injury to health and property was impressed upon Sir Alfred—among other speakers by our old friend Lord Provost Thomas Paxton, of Glasgow. A strong attack was made upon the domestic chimney. Sir Aston Webb would go as far as to have all kitchen ranges scrapped; and Sir W. Napier Shaw (of the Royal Meteorological Society) distinctly dissents from the exclusion by Lord Newton's Committee of ordinary domestic heating arrangements from legislation. If legislation is to be of any use, it must, he holds, deal with the domestic problem as well. Sir Alfred Mond was generally sympathetic. He would be. He has taken part in making the Black Country less black by the system of cheap fuel gas, obtained by the aid of Mond producers. The hope that Parliament would introduce legislation to compel the abolition of the domestic use of coal will not, he considers, be realized. In his opinion the work that has to be done can be accomplished best through local authorities, and those whose business it is to endeavour to make other forms of fuel cheap enough to supersede coal. He advises more propaganda, and still more. So we are exactly where we were so far as domestic heating is concerned; but nevertheless the repeated publicity is quite good propaganda.

Electricity Supply Bill.

It is evident the Electricity Supply Bill is meeting with more opposition than the Government anticipated; and it has been found necessary to defer proceeding with it for at least a week, in order to give time to ascertain if the opposition can be composed without wholly frustrating the main intentions of the measure. The Earl of Crawford referred to this in the House on Monday. Those among the electrical people who want to see the measure passed are feeling quite pained over the formidable opposition that is being shown to it and the financial powers that it contains. Those who are hostile would be very thankful if they could once and for all put an end to the new cumbrous system that proposes to commit the generation of electricity to bodies that in their constitution will contain elements that will have little cohesive tendency, and which, representing so many different authorities of diverse shades of opinion and electrical requirement, and with widely differing notions as to financial needs, will never pull together properly. This proposed reformation is all very crude; and therefore it is not strange that many men who are most concerned industrially are among the strongest opponents. They know the difficulties that there will be in the working of such bodies.

Engineering and Shipbuilding Troubles.

Last week the position of the engineering lock-out negotiations and the situation regarding the withdrawal of part of the shipbuilding war bonus of 26s. 6d. per week underwent some

remarkable changes. The shipbuilding employers gave formal notice to their men that the bonus would be reduced by 10s. 6d. per week as from March 29, and by a further 6s. per week as from April 26. The balance of 10s. will remain in abeyance. The notice also informed the men that the yards would be open to those who wished to continue at work on the new terms as from March 29. This notice seems to have caused some consternation at the headquarters of the Shipbuilding Trades Union Federation; and the delegates promptly came to a decision to take a ballot of the members on the revised proposals, if the employers would consent to postpone the operation of the notices until after the ballot. The conduct of the Unions and the men are forcing the employers to take sharp and decisive measures to put an end to the everlasting parleying. Then another important event was the official announcement of the result of the ballot taken by the Engineering and Shipbuilding Trades' Federation, the National Union of Foundry Workers, and the National Federation of General Workers upon the memorandum of the Engineering and the National Employers' Federation regarding managerial functions. Against acceptance, there were 164,759, and for acceptance 49,503. The big majority against, however, may be taken not as an expression of the opinion of the individual members of the Unions concerned, but as a vote of sympathy with the men who have been locked out—not that they appear to deserve much sympathy. In fact, no sympathy flows to them from any other quarter. Representatives of the National Joint Council were busy the week through over informal conversations with Sir Allan Smith, President of the Employers' Federation, in an endeavour again to bring together the parties to the engineering dispute. The week closed with the interesting announcement that an actual basis for negotiations had been arrived at. The men conceded the right of the employers to manage their own works; and the masters agreed to the right of the workers to be consulted before any material change in working conditions is effected—such consultation in all cases to be according to local custom and procedure. Negotiations were therefore revived on Monday; but the position remained critical, as the employers refused to withdraw the notices.

PERSONAL.

The Chair of Civil and Mechanical Engineering in the University of Leeds will shortly be vacant, owing to the resignation of Prof. J. Goodman, who has held the Chair since 1890. The University have appointed a Committee to recommend a successor. The University Council have recorded their sense of the value of the long and devoted service which Prof. Goodman has given to the Engineering Department. Prof. Goodman proposes to give his time to research; and the University Council have assigned to him accommodation for this purpose.

Gasoline from Oil Shale.

For the purpose of discussing the production of gasoline from oil shale, Mr. Ralph H. M'Kee, Professor of Chemical Engineering at the Columbia University, New York City, defines it as a hydrocarbon distillate, generally a petroleum distillate, 90 p.ct. of which boils below 374° Fahr., and all of which boils below 437° Fahr. It has a density of less than 50° Bé. To be commercial gasoline, it must, in addition, have but slight colour, and be free from certain types of impurities. In distilling most oil shales to get petroleum, there are formed simultaneously considerable quantities of ammonia from the nitrogen constituents of the oil shale. This ammonia is usually absorbed in sulphuric acid, and sold as ammonia sulphate. A shale oil plant, to be successful, must be able to handle cheaply and efficiently large quantities of oil shale, distilling it to get the crude oil and ammonia, and then cracking and refining the crude oil to give a motor spirit useful commercially. The Scottish plants do this, except that they devote considerable attention to the recovery of paraffin wax; and it is only the oil left after the wax recovery that is distilled to give lubricating oils, gasoline, and burning oils, or is cracked to give shale gasoline. The Scottish shale retort is of vertical pipe type; but when American oil shales are handled in this retort, there is found to be trouble owing to the pieces of shale sticking together, and adhering to the sides of the retort. For use on most American shales, says Prof. M'Kee, it is quite apparent that the Scottish form of retort must be modified or other retorts be devised on new lines. In the American shales there are larger amounts of oil, but generally distinctly less ammonia, than is produced from the Scottish shale. Therefore the retort to handle the American oil shale properly must be one which gives its attention primarily to the production of oil in quantity and of acceptable quality, and only secondarily to the production of ammonia. There are more than a score of retorting schemes which have been proposed by American inventors; but none has yet produced shale oil in large quantities.

ELECTRICITY SUPPLY MEMORANDA.

The London County Council are very anxious that the new Electricity Supply Bill shall be passed as early as possible. They say that it is in the public interest, because no really satisfactory scheme of electricity generation reform can take place without it. This does not give much credit to those who have hitherto been entrusted with the generation and supply of electricity, and who might be expected to know what is required and what can be done by them without the external aid that the Principal Act and the Amending Bill are intended to provide and apply. If the measure is not passed, the Council's Special Committee on Electricity Supply say the alternative, so far as London is concerned, will be to continue the present haphazard and disconnected arrangements, involving extravagant and piecemeal expenditure. And yet with it all, in normal times current was being supplied in London at an average price that would compare with most other cities in the world where electricity is generated by steam power. We do not think there will be extravagant expenditure if electricity develops from the existing condition of things. There is more likely to be extravagance by turning topsy-turvy the existing order of affairs, with the idea of quickly realizing something different. The disconnected arrangements can be linked-up, and nothing need be done in a haphazard manner. There is a lot of vague and airy talk about these matters that is not justified by fact. The County Council's interest in the question is mainly that they want to become top dogs in the electricity supply of London and the surrounding country. The Special Committee of the Council, however, are so hard put to it to obtain support for their views that they quote the Coal Conservation Committee's report of 1918 to the effect that 55 million tons of coal per annum would be saved on the present output of manufactured goods if the power supply of the United Kingdom were dealt with on comprehensive lines, which the 1918 Committee thought meant electrical lines. They do not quote the criticisms that have been made of those figures, nor do they point out that power supply is not the only application of steam in the factories of the United Kingdom. The Council had better by far devote themselves to ascertaining the advantage (if any) the consumers would derive from the proposed change in the way of cheaper energy, than dabble in figures which are hypothetical, and of which they know absolutely nothing of a material nature. There are well-known expert electrical engineers who rather fear that these schemes are going to make electrical energy dearer, and not cheaper; but then those engineers are not members of the London County Council, who perhaps think themselves better informed than those experts.

Encouraging the Government.

The Dawn of a New Day, and the Bill.

In the Engineering Section of "The Times Trade Supplement," there is an article headed "The Coming of Electric Supply." Electricity supply we had been under the impression came some forty years ago; but in black and white we are told that the "coming" is now. As the article is read, it appears that the author of it is of the belief that a new attitude—particularly financial—is coming, or is already here. He is persuaded that the financial and commercial position in the power supply department is sounder than has ever before been experienced. "While money has been withheld from most forms of new investment, every electrical prospectus is received as affording an attractive opportunity for acquiring property that is bound to improve." Gas undertakings have in their issues the last two years been finding the same thing—more especially since the Gas Regulation Act has been operating in remedying the mischief that the sliding-scale did during the war. But if the condition of things is as pictured by the enthusiastic writer on electrical topics in "The Times" Supplement, then no difficulty should be experienced by the Joint Electricity Authorities in raising funds for the work they have in hand, without powers being given to local authorities to lend them money, to guarantee interest, and to do other things financial which it is not in the best interests of ratepayers that they should be allowed to do. But it is the power companies—friendless ventures several years ago—who are now (in his opinion) the petted objects of good fortune and public favour. Their policy according to the writer was correct. They have a geography of their own, and are unfettered by municipal boundaries and administrative restrictions. Their geography is correct in principle; but it can be extended, so he appears to think, in accordance with the schemes of the Electricity Commissioners. There may be some question about this. The operating power companies have large areas that are well impregnated with industry representing large consumption, as well as authorities who take current in bulk. But the schemes of the Electricity Commissioners will cover extensive rural areas, which will reduce the profitableness of the larger concentration of industrial and bulk demand that the power companies can show. We cannot see the matter in quite the same light as the "Electrical Correspondent" of "The Times" Supplement. We may be wrong, and he right; but we are not at present persuaded. Another point in the article is that since statesmen discovered electricity [and what a mistake they made in not discovering the general power and heat problem!], it has received good publicity; and this has induced people to sit up and take more notice of

electricity. Strange that the much-advertised wonderful merits of electricity did not have the same effect prior to the statesmen discovering it. The writer of the article is of opinion that the politicians have created the impression far and wide that electricity is vital to our prosperity; and this impression must be worth very many thousands of pounds to those who have electricity to sell, or who venture into the City with underwriting schemes. Yet we find among the most strenuous opponents of the new schemes industrial and financial magnates; and this opposition clashes somewhat with the opinions of the electrical writer. But fancy electricity requiring the politicians to create an impression for it! Now, however, that it has been done, a short Bill should suffice to give the Joint Authorities power to raise money without external assistance, and so to order their trading with distributing undertakings that revenue unfailingly meets their outgoings.

Alternatives to Super-Power Stations. As we have said, there are competent men who doubt that the country is on the right road for securing cheaper electrical power. Prof. F. Bacon is one of them. He has written an article in the "Western Mail" in which he lauds the work of the electrical industry. No one—not even its strongest rival for business—questions that it has a valuable place in the system of things, and that to-day it is indispensable. But no one qualified for making judgment on the matter can be denied the right to an opinion as to the wisdom of pursuing any particular policy in the quest for cheaper electric power. Prof. Bacon claims the right to an opinion; and what is more, he gives expression to it in his article. He is not of that class of men who can swallow (like London County Councillors) hypothetical calculations as to immense savings of fuel resulting from the particular methods that have been advocated for refashioning electricity generation. He is sceptical on that point; but one fact over which he is not sceptical is that these things will entail a very heavy capital expenditure. There is indication that he has examined alternatives. What, he asks, are the alternatives to the high-speed turbo-alternator sets, the special characteristics of which are responsible for the development of the super-power station? His answer is, small scattered units which would develop power when and where required as cheaply as, or more cheaply than, it could be supplied from public supply mains. Chief among modern engines which are able to put up a good fight against schemes for wholesale electrification are the uniflow steam-engine, the gas-engine (particularly where waste heat in the form of coke-oven gas or blast-furnace gas is available), and various types of heavy oil-engine, such as the Diesel, the "hot-bulb," or the Crossley cold-starting heavy oil-engine. Other possibilities of the immediate future are the Fullager type of opposed piston internal combustion engine; the Still engine in which waste heat rejected to the cylinder jacket water and in the hot exhaust gases of a Diesel cycle are applied to generate steam, which does work on the opposite side of the piston. There is also a faint hope that some day the gas-turbine will become a sound technical and commercial proposition. We agree largely with the caution that is found in Prof. Bacon's words.

Different Requirements in Different Conditions. Of course, in these matters no one can generalize. Every case has to be taken by itself. One great mistake that has been made by those who are out for the super-power schemes is that they have only considered the matter from the power point of view, and then in a cursory way. They have not considered the question at all from the manufacturers' standpoint, nor from that of works conditions. One works varies immensely from another in respect of its requirements—not only for power but other things. Some works have surplus or waste gas at disposal which can well be used for electricity generation; other works require a considerable amount of heat, and can readily generate steam; others need steam for various purposes, and then an electricity generating plant is only an adjunct of the steam plant. When these and other conditions are taken into account, it is readily seen that there are works and conditions in which a super-station cannot possibly hope to generate, transmit, and supply current, so cheaply as it can be generated—being part of other requirements—close to the work for which it is needed. Moreover, there are new opponents of the super-power stations. They are those who want to see the thermal efficiency of generating stations increased considerably by becoming the suppliers of waste heat, instead of having that heat dissipated by the aid of costly condensing plant designed for the express purpose of getting rid of so much that is highly valuable. At a recent meeting of the north-western centre of the Institution of Electrical Engineers, Mr. C. I. Haden stated that some 9,200,000 tons of coal out of 10,000,000 tons used per annum represented the approximate value of heat wasted in the generation of electricity. At an average price of 30s. per ton, this quantity amounted to £13,800,000 out of a total of £15,000,000 paid for the coal. Mr. Haden suggested the combination of heat distribution with the generation of electrical current as a possible means of using coal to better advantage. The shutting-down of local stations would curtail the possibilities of heat distribution, which must take place within a limited area to prevent heavy heat leakage, which would make its distribution a perfect farce. The super-station would kill this business, if there is anything in it; and we doubt whether there is more in them than the ideal of a few visionaries, which is not likely to come to much.

Explanation Needed. We see that the Sheffield Gas Consumers' Association have recently been treated to a lecture by Mr. J. G. Pearce, of the Metropolitan Vickers Electrical Company. Short reports have appeared in the electrical papers; and there are points in the statements which require further explanation. One of them is that the lecturer considered the relative positions of gas and electricity for heating purposes, and stated that for a given amount of heat required by a consumer, a modern super-power station used less fuel than was needed in any other form of fuel conversion. This is postulation pure and simple. We should like to have some data from Mr. Pearce to ascertain how he justifies this assertion in relation to the conversion of coal that the gas industry indulges in—in ordinary practice, in the coal-gas and water-gas systems, and in complete gasification. The statement as to less fuel is hardly borne out by a warning that the lecturer gave in dealing with electric-furnaces. In this connection, he said that those who were considering the installation of electric-heaters should not compare merely the cost of electrical energy with the cost of gas at the power station and the gas-works respectively, as the efficiencies of distribution and application had to be considered. Certainly! Such consideration is precisely what gas people give to the subject. They supply costs based on actual work done, and not the cost of gas at the place of production. Mr. Pearce does not seem well informed on these matters.

Hiring Business. Some electrical men have not much idea as to proportion, nor as to the views of people not in affluent circumstances regarding the amount of rent they will pay for any convenience. In connection with the hiring-out of electrical appliances, for instance, there are some crude notions abroad as to the capacity or willingness to pay rent of the class of people it is desired to capture as consumers; and these are the people who cannot afford to buy appliances. In the Commercial Development Section of the "Electrical Times," it is again urged that consideration should be given to the question of hiring-out appliances, as only by this means will the people become electricity consumers who cannot afford to purchase such appliances outright. Reference is made to what Glasgow is doing in the matter of hiring-out cookers at a hire rate of £2 per annum. Of this we are confident—that working-class consumers will look long and stedfastly at the £2 before they will annually part with it as rent for an electric or any other cooker, The rent is to be paid quarterly in advance, which is quite a good move in case anything goes wrong with the cooker, and the irate user refuses to pay. The cooker we see is to be kept for a period of not less than a year. Should it be removed earlier, the consumer is to pay the hire for the full year. The drafters of the conditions have provided against eventualities of which experience has informed them.

Combined Coke Quenching and Loading.

A combined coke quenching and loading machine, in operation in connection with the Eckington coke-ovens of Messrs. J. & G. Wells, Ltd., has been described and illustrated in the "Iron and Coal Trades Review." The joint patentees of the machine are Messrs. Thomas Greensmith and R. W. Cuthbertson; and it was made by Messrs. Horace Greaves and Co., Ltd., of Derby. It is declared to be giving excellent quenching and loading results, and, while being free from undesirable mechanical complications, to be of very robust construction throughout. The machine is 42 ft. long over-all, and 11 ft. wide. On the oven side there is a water-tank 16 ft. long by 6 ft. 6 in. deep at the top end, and the full width of the machine. This tank having been filled with water to a predetermined level, the machine is travelled to the oven to be discharged. The coke-ram then pushes the charge out of the oven over a platform about 5 ft. wide between the oven and the quencher. On reaching the edge of the platform, the coke automatically breaks up, and, falling into the water, is instantly quenched. When about one-third of the coke has fallen into the tank, the conveyor, which is also part of the machine, is started, and slowly draws out of the tank that coke which was first quenched. As soon as the charge is fully delivered, the conveyor is stopped, and the surplus water run out of the tank through a valve. After the coke has remained on the conveyor for a short period to dry and steam off, the conveyor is again started-up, and delivers the coke over a screen arranged at the end of the machine for the removal of the breeze, direct into railway wagons. The percentage of moisture carried over with the coke is said to be less than in the case of that quenched by the ordinary methods. In the installation under notice, by the old method the moisture content varied from 4·5 to 6 p.ct.; whereas the machine-quenched coke has an average moisture content of no more than 2·5 p.ct. Added to other obvious advantages is the important consideration of working costs; one man only being required to manipulate the whole operation of the machine per shift, as compared with seven men per shift required to handle the same quantity of coke on the flat bench. The conveyor makes but one complete revolution per oven drawn, which reduces its maintenance cost to a minimum figure.

GLOVER-WEST VERTICALS AT BLACKBURN.

Inspection and Inauguration of the Installation at the Greenbank Gas-Works.

Thursday in last week was a day to be remembered by the Blackburn Corporation, in that it marked the completion of a very great work in the Gas Department—the construction of the Greenbank Gas-Works, and the installation of new Glover-West vertical retorts thereat. The story of these works and their equipment with vertical retorts is well told in a beautiful souvenir pamphlet which was presented to each of the large company attending the official opening of the new retorts last Thursday, performed by Councillor Ernest Hamer, J.P., the Chairman of the Gas Committee. Extracts from this pamphlet are given below.

History of the Blackburn Gas Undertaking.

When the gas undertaking was purchased by the Corporation from the Blackburn Gas Light Company in 1878, the annual output was about 315 million c.ft. For the year ended March, 1921, it was over 843 million c.ft., and the number of consumers exceeded 36,000. At the date of the purchase there were two works—one in Jubilee Street, and the other in Addison Street—and it was realized that both were expensive to run, since neither had access to the railway. The whole of the coal had to be carted to the works; and the coke and other bye-products were removed by the same means. In 1900 the Greenbank works were opened, on a site giving ample room for the erection of extensive gas-making plant, and in direct communication with the main line of the London and North Western Railway, which runs alongside.

Inclined Retorts.

The carbonizing plant consisted of an inclined retort-bench of ten settings, to which an extension of eleven settings was added ten years later. The total capacity of the inclined retort installation was 2 million c.ft. per day. Coal for this installation is taken from a coal-store arranged beneath the gas-works elevated sidings, where the railway wagons are tipped into the receiving hopper above the coal-breaker. It is elevated, conveyed, and distributed mechanically in the coal-storage bunkers arranged above the charging stage of the inclined retorts. The incandescent coke is quenched and removed in a conveyor extending the full length of the retort-house, and, by means of the same conveyor, is elevated and delivered to an overhead hopper. The coke-hopper, with the water-tank above it, is constructed of ferro-concrete. The durability of this material has been fully proved in a working life of twelve years.

Vertical Retorts.

When the inclined-retort installation was put into operation, the Jubilee Street station was closed down, and the site taken over by the Corporation Electricity Department; but before the end of the war it was evident that further carbonizing plant would be necessary. A contract was therefore made in 1919 with West's Gas Improvement Company to erect an installation of their Glover-West vertical retorts, of a nominal capacity of 3 million c.ft. per day, together with a complete system of coal and coke handling machinery, including a crane gantry and overhead storage hoppers for coke.

Foundations.

It was realized the site would call for particular consideration as regards the necessary foundations to carry the heavy loads due to the concentration of a large carbonizing capacity on a relatively small area. The nature of the subsoil had been thoroughly investigated during the erection of the inclined-retort installation; but further trial holes were excavated on the site for the vertical retorts, and the contractors engaged Mr. Burnard Geen, M.Inst.C.E., Consulting Engineer, of Westminster, to design the foundations for the retort-bench, and the coal-breaker pit, as well as the crane gantry and the coke storage hoppers in ferro-concrete, with their foundations.

It was decided to carry all the main loads on piles, as had been previously done in the case of the inclined-retort house; and 276 piles of the Simplex "cast-in-place" type were driven to depths varying from 30 ft. to 40 ft. The piles are reinforced in the upper 25 ft., and connected together by ferro-concrete rafting. One side of the retort-bench is supported on piers of the same material. The coal-breaker pit was constructed beneath the elevated railway in the coal-store, without putting the latter out of use. The maximum depth of the pit is 16 ft.; but, in spite of the presence of a great deal of water immediately below the surface, the pit has been made water-tight.

The whole of the foundations and other concrete work is made with a granite aggregate, and in the proportion of one part of best portland cement to two parts of clean sand and four parts of the aggregate, except the coal-breaker pit, which is made in the proportions one to one-and-a-half to three.

The Glover-West System.

Vertical retorts on the Glover-West system of continuous carbonization were selected for the Blackburn installation because (to use the words of the printed description) "it was realized that this system is the best adapted to take advantage of the changed conditions of gas supply due to the coming in force of the Gas Regulation Act in 1920."

The installation at Greenbank consists of 96 retorts arranged in two benches, each of six settings. The normal capacity is 3 million c.ft. per day. Not only, however, will this be considerably exceeded, but it has already been demonstrated that the anticipations with regard to increased yields of gas and residuals per ton of coal carbonized and other attendant advantages will be fully realized.

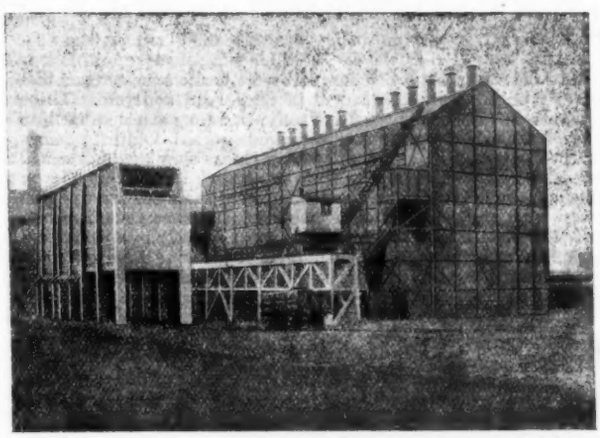


Fig. 1.—A General View of the New Installation.

The most important of the outstanding features of the Glover-West design of continuous vertical retorts is the method of heating. The Glover-West settings are designed on scientific principles, so that the maximum heat is not located at a fixed region of the retort, but can be applied at any required point in its length. This enables any class of coal to be carbonized under such conditions that the fullest advantage can be taken of modern methods of gas manufacture.

The Retorts.

The size and the elliptical shape of the retorts are based on an experience extending over 4000 retorts in actual operation. Taken together they ensure a minimum of inconvenience to the stokers, the maximum efficiency in the absorption of heat, a long working life without distortion or leakage, and a minimum cost for repairs. The walls of the retorts are built up of tongued and grooved segments made of the very best high-refractory silica materials, specially selected for the purpose, and manufactured under the direct supervision of West's Gas Improvement Company at their

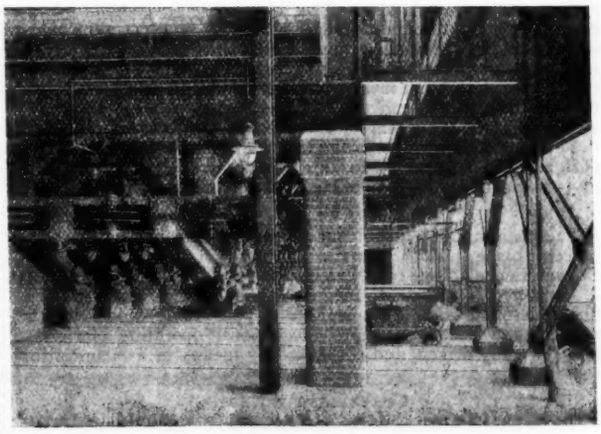


Fig. 2.—A View Showing the Discharging Mouthpieces.

Derbyshire brickworks. The retorts are built with a taper from top to bottom, to ensure an even and constant descent of the charge with the minimum wear on the side of the retorts. Each retort bench is braced on all sides in a framework of steel joists; but the brickwork is constructed with carefully-devised expansion spaces, so that, on the one hand, no undue strain is thrown on this bracing, and, on the other hand, each setting can be brought in and out of action without disturbing the action of the neighbouring settings.

Another essential principle in the Glover-West design is the construction of each setting as an independent unit. For this reason, each setting is provided with a separate chimney, so that

the conditions of the furnace can be adjusted in each without in any way affecting the others.

Coal Handling.

The coal is discharged from wagons running on the elevated railway of the coal-store, forming sidings from the main line, by means of a set of twin hydraulic tippers, into the boot of a short elevator. It is delivered into a coal-breaker carried on a structure above the ground level. This arrangement was adopted to reduce the expense and risk of excavation in water-logged ground. The broken coal passes by way of a shoot and rotary filler to the buckets of a gravity-bucket conveyor, by means of which it is elevated and delivered to either of two push-plate conveyors arranged above the coal-storage bunkers of the retort-bench. These bunkers contain 48 hours' supply of coal to the retorts. Provision is made for the duplication of the coal breaker and elevating machinery.

Coke Handling.

The coke for sale is discharged by the crane over screens to a battery of hoppers constructed in reinforced concrete. These hoppers have a capacity of 250 tons; and they are divided into 17 self-clearing compartments arranged in groups with openings in the bottom delivering into railway trucks running on a track connected with the sidings of the gas-works. In addition, eleven side shoots are provided for feeding motor lorries on the side away from the retort-house. The coke is thus screened, sorted, and delivered into vehicles for transport entirely by mechanical handling. The hoppers are 46 ft. high, 105 ft. long, and 19 ft. 6 in. wide, and are carried on sixteen columns, which in turn are supported by piles.

Fig. 3.—A View of the Charging Stage.

The crane gantry is constructed entirely of reinforced concrete, and carried on piles. A platform 5 ft. wide is made of the same material, monolithic with the structure, and provided with hand-railing and access ladder. The rails are 7 ft. gauge, and are mounted on longitudinal timber sleepers which take-up the shock of the working of the crane, and rest on the top members of the trussed beams; the trusses being 9 ft. deep, with a clearance of 9 ft. above the ground level. The beams and columns are braced in both directions; and the whole structure is perfectly steady when the crane is running.

The steam locomotive crane is of an exceptionally substantial design. It is constructed to lift a gross load of 2 tons at a radius of 35 ft., with slewing, travelling, and derricking motions.

Power Supply.

The coal-handling machinery is driven by electric motors; the current being taken from the Corporation supply. The coke extractors are driven by a gas-engine, with an electric motor as a stand-by. The lift, by means of which ashes from the producers are elevated to a storage hopper for removal by the railway and access given to the several operating platforms, is electrically driven, and controlled by means of a push-button switch in the cage.

Convenient Access.

The whole installation is generously provided with platforms and staircases, so that every portion of the machinery and the settings can be conveniently reached by the operators and inspected by the management.

The gas from the vertical retort installation is controlled by two retort-house governors, from which the 24 in. main leads to the auxiliary plant, which has been considerably enlarged to correspond with the growing output of the works.

Condensers.

The condensing plant consists of two batteries of annular or atmospheric condensers, and two columns of water tubes in square cast-iron towers. A contract for additional condensers has been placed with Messrs. W. C. Holmes & Co. These will consist of four columns of water tubes in steel cylindrical towers, and be capable of dealing with 4 million c.ft. of gas a day.

Exhausters.

The exhauster-house is a lofty brick building with tiled walls and floor and a pitch-pine ceiling. It measures 45 ft. long by 24 ft. wide. There are two sets of Waller's exhausters, each capable of passing 80,000 c.ft. per hour, and one Bryan Donkin machine with a capacity of 250,000 c.ft. per hour. All three sets are steam-driven; the steam being supplied from two boilers fixed in an adjoining house.

The gas inlet and outlet mains are placed in a roomy cellar, and all are 24 in. diameter. On the wall in the centre of the house is a mahogany board, on which is grouped a battery of 36 in. pressure-gauges.

Washing Plant.

This apparatus is located in the open, and comprises two Livesey washers, one of which has a capacity of 2 million c.ft. a day with 18 in. diameter connections, and the other a capacity of 4 million c.ft. and 24 in. connections, together with a twin set of Holmes rotary washer scrubbers of a daily capacity of 4 million c.ft. An extension to this plant is under consideration.

Purifiers.

The purifier-house is 148 ft. 6 in. long by 79 ft. wide. It contains eight purifiers, each 35 ft. square, with luteless lids. The purifier-boxes are carried upon a superstructure enabling the spent oxide to be easily discharged to the revivifying floor beneath. Duplicate elevators and band conveyor, driven by a gas-engine, are provided for filling the boxes with fresh oxide. Two 24 in. Weck valves control the working of the purifiers; and the connections are so arranged that two separate streams of gas can be admitted.

Station Meters.

The meter-house is 46 ft. long by 32 ft. wide. It contains two meters, one of the water-drum type to register up to 100,000 c.ft. of gas per hour, and the other a rotary meter, which has been recently installed to deal with 200,000 c.ft. per hour. There is a great saving in space effected by the adoption of the latter type of station meter.

Laboratory.

The works are provided with a well-equipped laboratory, in which routine and special tests are carried out. The recording calorimeter of the Beasley type already shows the steady line indicating the constant quality of the gas produced in the continuous vertical retorts.

Tar Distillation.

A "Hird" complete tar-distillation plant was erected about two years ago, capable of dealing with 30 tons of crude tar a day. From a large circular tank, in which the crude tar is stored alongside the plant, it is pumped into a feed tank, whence the plant itself is supplied. The stills and other distillation apparatus are under cover; and the coolers, receivers, and storage tanks are fixed outside the building. The waste gases pass through an oxide purifier. Two large pitch-beds are provided.

Boilers.

The boiler-house, adjacent to the exhauster-house, contains two Lancashire boilers, each 8 ft. 6 in. diameter by 30 ft. long, sufficient to generate the whole of the steam required for the auxiliary plant and machinery. They are equipped with forced-draught furnaces, and are suitable for the use of coke-breeze.

Pumps.

The tar, liquor, and water circulating pumps for all purposes are located in a house adjoining the exhauster-house.

Sulphate Plant.

The sulphate plant is rather old, and hardly large enough for present-day needs. It is capable of producing about 35 cwt. of ammonium sulphate a day. The saturator is new, and is fitted with automatic discharge and draining board. There is a storage room for 120 tons of salt; and the walls are lead-lined.

Benzole Extraction.

A benzole plant was installed during the war, but has not been in use for the last two years.

Workshops.

The mechanics' shop has become congested as the capacity of the works has increased; but it is hoped to effect some improvement at an early date. It is fitted with lathe, power hack-saw, and screwing and pipe-cutting machine. The blacksmiths' shop contains two forges and a drilling machine, together with the usual tools for repairs to stokers' implements. The meter shop, in which the greater part of the repairs to meters is carried out by an experienced staff, contains also a testing station fitted with test meters and holders to meet the requirements of the Board of Trade.

Stores.

The whole of the stores necessary for carrying on the works and distribution department are issued from this building. The smaller fittings are kept in numbered steel bins, and bars of iron and steel tubes on racks. A well-thought-out card system enables the storekeeper to ascertain the state of the stock of any particular item.

Railways, Sidings, and Transport.

The works are well served by siding and railway accommodation connected to the main line of the London and North Western

Railway, which runs by the works. A good service of railway lines has been laid down all over the works; and the department possess their own coke and ash wagons, and a Peckett locomotive for internal traffic. The locomotive shed is provided with a pit for inspection and repairs.

The road vehicles for local trade and traffic are accommodated at this works. Two "Sentinel" steam wagons have done all the work of local distribution of coke for the last eighteen months; and two "Ford" lorries have been used for the transport of men, material, and stores in connection with the distribution service. A roomy garage is situated near the entrance to the works; and repairs are carried out on the premises.

The entrance gates are flanked on one side by the foreman's house and the weigh office, and on the other side by the superintendent's house and office. The weighbridge is of modern design and 20 tons capacity, and is specially constructed to accommodate heavy motor vehicles of long wheel-base. The time-keeping is checked by a clock operated on the card system.

DISTRIBUTION AND STORAGE.

The four gasholders, with a total capacity of 5 million c.ft., are situated at the Addison Street station, where two district governors are also installed. At certain periods of the day it is possible to send all the gas made through the 24 in. district governor at the Greenbank works. At other periods, however, when the demand is not equal to the make, "boosting" to the holders, which are two miles away, has to be resorted to. The boosters are located at the Addison Street station. They are driven by Terry steam-turbines. The capacity of each is 250,000 c.ft. per hour; and they are connected to the gasholder inlet. The gas is drawn by the boosters direct from the Greenbank works through an independent 18-in. main from which no service is taken. An automatic bye-pass valve comes into operation when the boosters are out of action.

The proceedings may be said to have begun with a rendezvous at the railway station, and the transport thence, by special train, to the Greenbank works, which are in close proximity to the main line of the London and North-Western Railway. The works are near the town, yet sufficiently remote to save the town-dwellers from any of the disabilities which are popularly supposed to be the accompaniments of gas-works. There was a careful inspection of the works under the guidance of the Engineer and General Manager (Mr. George P. Mitchell) and his assistants. The installation has been carried out by West's Gas Improvement Company, Ltd., of Manchester.

Returning to the Public Halls, in the town, the visitors were the guests of the Corporation at luncheon—the Mayor (Alderman Joseph Fielding, J.P.) presiding. While the luncheon proceeded, the band of H.M. Royal Marines gave a selection of music. Subsequently there was the usual speech-making.

Mr. W. M. MASON (Manager of the British Commercial Gas Association) proposed "The Blackburn Corporation Gas Undertaking." He complimented the Corporation on the progressive spirit they were displaying, and on their recognition of the duty they owed to the community and to the undertaking of which they were in charge.

Councillor HAMER, responding to the toast, paid a further tribute to Mr. Mitchell. "We have every reason," he said, "to be proud of the selection we made when we appointed Mr. Mitchell Gas Engineer of this important borough." As to the Greenbank works, the results had been such that the best hopes of the management had been more than realized. He also congratulated the contractors on their work. He desired, he said, to thank Alderman West, the head of the firm, for the great kindness he had shown throughout the carrying-out of the work; and he was sure Mr. West had every reason to be proud of the gas-works formally opened that day. In closing his remarks, Mr. Hamer evoked some cheers by announcing that at the end of this month the Gas Committee hoped to be able to reduce the price of gas.

Alderman J. W. FORREST, O.B.E., in proposing "The Contractors," made grateful reference to the late Mr. John West, and congratulated the Contractors on the work they had accomplished. The firm, he added, had contracts for work in America, Japan, China, New Zealand, and Denmark. In regard to the last-named country, he understood that Mr. West secured the contract after close competition with a German. This was an instance, Mr. Forrest submitted, which showed that this country was not yet done.

Alderman WEST, in his reply, pointed to the better conditions of working which were secured for the employees by installations like the one now completed. But, apart from this, he believed the Engineer and his staff had created the right atmosphere and the right conditions; and it was due to them that the plant was working in a manner to produce the pleasing results referred to by Mr. Hamer. At the conclusion of his remarks, Alderman West presented the Mayor and Councillor Hamer with a silver salver, suitably inscribed, as a souvenir of the day's proceedings.

The toast of "The Visitors" was proposed by Councillor J. WALSH (Vice-Chairman of the Gas Committee), and was acknowledged by Councillor C. F. CRITCHLEY, J.P., C.C. (St. Annes-on-Sea).

Alderman T. C. ABBOTT (Manchester) proposed the health of the Mayor.

His WORSHIP responded, and closed by proposing the health of "The Gas Engineer and Manager"—a toast received with enthusiasm, and duly acknowledged by Mr. MITCHELL.

Gas as an aid to sports and games forms the subject of a suggestive issue [No. 97] of "A Thousand-and-One Uses for Gas," which describes and illustrates various installations for lighting and water heating, in connection with athletics, billiards, shooting, tennis, bowling, &c.

AIR POLLUTION.

The Peccant Domestic Coal Grate.

THE Meteorological Office of the Air Ministry have issued the seventh report of the Advisory Committee on Air Pollution.* It deals largely with observations and investigations made during the year ended on March 31, 1921. Information is given as to the deposit-gauges employed, and regarding the effects of wind and rain upon them. Experiments are also being carried out by Dr. J. R. Ashworth, of Rochdale, with a twin gauge; the object being to ascertain, if possible, the direction from which the impurities deposited on the gauge come. The results so far are promising; and they are described in a note contributed to the report by Dr. Ashworth. Tabulated deposit results for the year succeed.

The next section deals with suspended impurity in London air. The measurements for this are made by Dr. J. S. Owens' device, which consists of an automatic instrument that filters a measured volume of air through a definite size disc of white filter-paper. The method involves the use of a calibrated scale of shades, the numbers of which indicate the quantity of impurity. There is information here which shows how much the domestic coal fire is responsible for air pollution. Curves are given; and features are observed that are common to them all. It is seen, for example, that the air is purest between midnight and early morning, about 6 to 7 o'clock. On weekdays and Saturdays at about 6 a.m. or a little before, and on Sundays at about 7 a.m., a rapid increase in the amount of impurity begins. This continues until a maximum for the day is reached—on weekdays and Saturdays about 10 o'clock or a little later, and on Sundays at about 11 to 12 o'clock. In all cases, the quantity of suspended matter begins to fall-off rapidly after this maximum, which seldom lasts for an hour, usually less; and in the afternoon the quantity continues to fall until a second, but lower, maximum appears about 4 or 5 o'clock, which may be continued until about 8 o'clock, after which there is sometimes a still more rapid drop from 10 p.m. till midnight, when the quantity again reaches a minimum.

It is evident from this that the quantity of impurity present bears a close relationship to human activities. The most noticeable fact is the uniformity with which the impurity commences to increase at the time when fires are lighted in the morning, and the almost complete absence of impurity during the period from midnight to 6 or 7 a.m. when both domestic and factory fires are out of operation. The peak in the afternoon is at about 4 to 5 p.m., which suggests a tea-time rise; and the falling-off in the evening, about 8 to 10 p.m., is evidently connected with the reduction and final letting-out of fires. From the fact that the greatest quantity of impurity is in all cases found in the forenoon, corresponding to the time when the fires are attaining their full working heat (although during the afternoon when fires are still in operation the impurity rapidly diminishes), it may be legitimately inferred that the main source of smoke impurities is from fires during the process of attaining their full heat. It is also obvious from one of the curves that there is not a very great difference between the amount of impurity present in the air on ordinary weekdays and on Saturdays or Sundays; and it is fair to conclude from this that, since the closing of factories on Sundays does not make a very great difference, domestic smoke must be the chief source.

An attempt has also been made to ascertain the effect of suspended impurity on health; but so far no great amount of success has resulted from this, owing to the difficulties interposed by complicating factors. Dr. Owens makes quite a large contribution to the report. There are notes by him on "The November Fogs in London," "Dust in Expired Air," and "The Relation of Visibility to Suspended Impurity." Research work is now proceeding on the measurement of acidity; but no definite result is available. It has been concluded that, for the measurement of acidity in the suspended matter of the air, the calorimetric method as first tried is unsuitable, and attention has therefore been concentrated on estimation by means of electrical conductivity. But this method is extremely sensitive; and with such sensitiveness, experimental difficulties are great.

* "Report of the Advisory Committee on Atmospheric Pollution, with Observations for the Year ending March 31, 1921." London: H.M. Stationery Office, Imperial House, Kingsway, W.C. Price 2s. 1½d. post free.

Society of British Gas Industries.—The annual general meeting of the society will be held at the Hotel Cecil, London, W.C., on Thursday, May 11 next, under the presidency of the Rt. Hon. Lord Riddell. The programme of arrangements for the meeting will be announced later.

Benzole Production in France.—The Paris correspondent of the "Engineer" writes that a Commission have been appointed by the Government to draw-up a programme for the production of benzole in France and the Colonies. This is in pursuance of the policy carried out for some time past in favour of creating a "national fuel"—that is to say, the production of power alcohol and benzole in sufficient quantities to supply the whole of the home needs. At present France does not produce more than 800 tons of benzole a month; and Germany supplies about 2000 tons a month, which is largely used as a motor fuel by mixing it in equal proportions with petrol.

SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.

A well-attended General Meeting of the Association was held last Thursday, in the Connaught Rooms, Great Queen Street, W.C.; the members lunching together before proceeding to the business of the day—the main item of which was the Presidential Address of Mr. J. M. Campbell, the Engineer and General Manager of the Isle of Thanet Gas Company, Margate. There was only one thing which gave rise to unanimous regret, and this was the absence of the outgoing President, Mr. J. Wesley Whimster, of Bath, who was unfortunately suffering from the effects of an attack of influenza. During the meeting, at the expressed wish of the members, the Hon. Secretary (Mr. W. H. Bennett) dispatched to Mr. Whimster the following telegram: "The members of the Association meeting here deeply regret your absence, and cordially thank you for your services as President."

The Luncheon.

At the luncheon, Mr. J. M. Campbell, as President-Elect, presided; and he was strongly supported by his Board, there being present: Mr. Walter Hills (Chairman of the Isle of Thanet Gas Company), and Mr. W. Booth Reeve, J.P., Col. E. O. Skey, J.P., Mr. William Young, Mr. W. J. Mercer, J.P., and Mr. J. A. Gribble (Directors), together with Mr. A. J. Stickels (the Secretary). The only absentee was the Deputy-Chairman (Mr. William Tomlin, J.P.), who had another important engagement. There were also with the President-Elect Mr. Charles F. Botley, of Hastings (who immediately preceded Mr. Whimster as President), and Mr. P. S. Hoyte, of Plymouth (the Vice-President). Central bodies connected with the industry were officially represented. After the honouring of the Loyal Toast, the President-Elect said he knew they would be sorry to learn that the retiring President, Mr. J. Wesley Whimster, was unable to be with them that day, owing to indisposition. Mr. Whimster had telegraphed to him as follows: "Deeply regret under doctor's orders unable to attend meeting to-day. Please express my sincere thanks to members, Committee, and Secretary for valuable support during past year. Wishing you every success during your Presidential year." They all wished Mr. Whimster a speedy restoration to health.

The Visitors.

Mr. P. S. Hoyte (Plymouth), as Vice-President, proposed the toast of "The Visitors," coupling with it the names of Mr. Walter Hills (the Chairman) and the other Directors of the Isle of Thanet Gas Company, whom they were delighted to have among them that day. "We cannot," declared Mr. Hoyte, "see too much of Directors—on occasions like this, at any rate." [Laughter.] Indeed, I wish very often they could be present at our business proceedings, so that they might see what we are up to at these meetings that we have to run about to attend. I am sure if they did they would see that the time we spend upon them is not wasted. Directors have many uses; and, among these, we have found them to form most admirable material for receiving explanations in the first place of the beautiful simplicity of the therm basis of charge, as compared with the old cubic feet method. If only you are fortunate enough to make your Board see the charm of the new idea, you will have no difficulty with the rest of your consumers. [Laughter]

Mr. Walter Hills said it fell to him to respond on behalf of the visitors, who included eminent representatives of the gas industry, as well as the Directors of the Isle of Thanet Gas Company. He thanked them most sincerely for the kind and generous way in which they had honoured the toast so ably and happily proposed by Mr. Hoyte. The election or selection of Mr. Hoyte for this purpose was, if he was rightly informed, not without significance; and if their lives were spared until this time next year, presumably Mr. Hoyte and Plymouth would be very much in their thoughts. He had never had an opportunity of seeing Plymouth, but would like to do so, and to visit the gas-works. With regard to the honour that the Association had conferred upon his Company's esteemed Engineer and General Manager, by electing him their President for the ensuing year—an honour which reflected itself upon the Company he represented, and which the Directors very much appreciated—he wanted to tell them, in his own name and in the name of his co-Directors who were present with him, that they had a very high opinion of Mr. Campbell. They very greatly valued his services, not only because of his considerable technical ability, but because of his other attributes—his business aptitude, sound judgment, remarkable prevision, and great energy and determination, coupled with a high degree of commercial morality. These qualities in Mr. Campbell represented an efficiency to which the Directors mainly attributed the success of the Isle of Thanet Gas Company during the last twelve years. Therefore the Board could confidently submit to the Association that Mr. Campbell would discharge the duties of his office to the entire satisfaction of the members. He (the speaker) had been deputed to extend to the Association a very warm invitation to visit Margate, its gas-works, and its Gas Company, on Friday, May 26, when they would all do their best to make the visit enjoyable and interesting. He hoped they would come prepared to stay over the week-end, and that they would bring their ladies.

The President-Elect remarked that he would be wanting in his duty, if he failed to acknowledge what Mr. Hills had been kind enough to say. At the same time, he did not think that any gas official had been blessed with such a genial and happy set of Directors as he had. This statement he knew would be endorsed by Mr. Stickels, the Secretary. He (Mr. Campbell) had been with the Margate Company for twelve-and-a-half years; and everyone of the present Directors had joined the Board since he was appointed. But the same harmonious feeling existed now between the officials and the Board as did previously. Such remarks as they had just heard from Mr. Hills certainly tended to "grease the wheels," and make the object of them work with even greater ardour and with additional effort on behalf of his undertaking.

A Vigorous Association.

Mr. H. J. Ruggles (Leighton Buzzard), the President of the Eastern Counties Gas Managers' Association, who was heartily welcomed by Mr. Campbell, then proposed "The Southern Association of Gas Engineers and Managers." He said he saw by the report that the Association were progressing, and extending their sphere of usefulness, while he understood from the Secretary that the funds were also very flourishing. More than this they could not very well wish for. On behalf of the Eastern Association, he wished Mr. Campbell every success in his year of office. The welfare of the Southern Association was certainly absolutely safeguarded with him in the chair.

The President-Elect, in response, said the Association were still "going very strong;" the membership now standing at 266, which was an extremely good representation. They covered an immense area, and prided themselves upon being, if not the strongest, at any rate one of the strongest Associations in the country. They were proud to think they numbered among their members the President of the Institution of Gas Engineers, Mr. Thomas Hardie, whom they had hoped to have with them that day. Unfortunately, however, Mr. Milne Watson, Mr. Thomas Goulden, Mr. Hardie, and others, were engaged at a conference which prevented them from being present. The Association numbered among their members many of the illustrious men connected with the industry; and, to adapt an old saying, it might be stated that "what the Southern Association think to-day, the gas industry will think to-morrow." This had been shown by papers contributed from time to time by members to the proceedings of the Association. They were also blessed with a very energetic Hon. Secretary, who kept everything up to the mark, and was always endeavouring to secure new members.

THE BUSINESS MEETING.

The members then adjourned to another room, where the business meeting was held. Mr. C. F. Botley, of Hastings, occupied the chair during the earlier part of the proceedings, and referred with regret to the absence of Mr. Whimster and its cause.

Confirmation of Minutes.

On the proposition of Mr. Botley, it was agreed to take as read the minutes of the last meeting, as reported in the "Journal."

Annual Report.

Mr. Botley then proposed, Mr. A. W. Sumner (Grays) seconded, and it was agreed, that the annual report of the General Committee for 1921 be taken as read and adopted.

The report included the following items:

In presenting their report for the past year, the General Committee feel that they have again to record a year of continued and substantial progress in the activities of the Association.

The year under review, covering, as it does, the first year of real work under the Gas Regulation Act, has witnessed, as a direct outcome, an increased interest in the problems of carbonization—an interest that has, naturally, been directed towards the production of the largest output of therms per ton of coal.

The agreement with regard to wages which has been arrived at, based on the cost of living, has stabilized and steadied the industry in this important respect in a way that augurs well for its future progress and prosperity.

The recedence from the war period and the approach to more nearly normal conditions have led to a stimulation of the industry's activities on the sales and distribution side; and in this direction the Association are particularly indebted to Mr. Sandeman for his instructive and inspiring paper on "The Organization and Administration of a Sales Department."

The Committee deeply regret having to record the death of the following members: Mr. J. H. Cornish, senr., of Bridgwater; Mr. Arthur Easton, of Faversham; Mr. T. S. Lacey, of London; Mr. T. H. Nixon, of Walton-on-Thames; Mr. W. B. Randall, of Waltham Cross; Mr. W. Thomson, of Ramsgate; and also that of Mr. Edward Price (late of Hampton Court), who, though no longer a member at the time of his death, was the last survivor of the founders of the Association, and did much to further its objects.

Three members resigned during the year, and the names of five members were removed from the list under rule 3, owing to their subscriptions being in arrear. On the other hand, the new members elected leave a total of 266 members, as compared with 259 at the end of 1920.

The receipts during the year were £268 18s. 8d.; while the expenditure amounted to £252 12s. 9d.—showing a credit balance of £16 5s. 11d. The total funds on Dec. 31 were £31 8s. 7d.

Second Annual Report of the Committee of the Eastern District.

The Eastern District has enjoyed a very prosperous year; the average attendance at the meetings being 32.

While the discussion of commercial subjects (many of which are of the utmost importance) still occupies first place on the agenda of the meetings, arrangements were made, early in the year, by which a

greater proportion of the available time was devoted to technical matters.

It was also decided that a series of discussions on "Gas-Works Apparatus" should be inaugurated, verbatim reports made, and copies supplied at cost price to those members desiring them. This has been carried out; and 109 copies are now distributed after each meeting, proving the innovation to be appreciated by a large number of members.

The more important technical matters dealt with during the year include the Gas Regulation Act, calorific testing, retort-house furnaces, firebricks and settings, "Is Lighting Worth Keeping?" declaration of calorific value, and naphthalene.

The following District Officers were elected to serve during the coming year:

Chairman.—Mr. Chas. Chambers.
Vice-Chairman.—Mr. W. J. Sandeman.
Committee.—Messrs. A. H. Andrews, C. F. Botley, A. G. Cheal, J. Fisher, H. C. Head, L. J. Langford, F. Livesey, P. G. G. Moon, W. E. Price, F. Smallbone, and J. Thorman.
Representative Members of the Eastern District to serve on General Committee.—Messrs. G. M. Gill and C. H. Rutter in place of Messrs. W. E. Price and C. Chambers, retiring by rotation.
Hon. Secretary.—Mr. L. Trewby.

The total membership of the Section is 218, of whom 101 are representative members and 117 ordinary members.

LEONARD J. LANGFORD,
Chairman.

SECOND ANNUAL REPORT OF THE COMMITTEE OF THE WESTERN DISTRICT.

During the year ten meetings have been held in the district, the places of meeting being Bath, Bridgwater, Exeter, Plymouth, and Torquay.

The number of members attending meetings has averaged sixteen; and in view of the scattered nature of the district, this must be considered satisfactory. On two occasions the attendance has fallen much below the average; and in view of the benefits obtained, it is hoped that the meetings in the future will be more regularly supported.

Many important topics have been discussed, among which are markets (which include coal, coke, tar, sulphate of ammonia, sulphuric acid, and spent oxide), the Gas Regulation Act, the housing question, and employers' liability insurance—all of which have proved of great assistance to the members personally, and, to a greater extent, the undertakings which they represent.

Among other matters of importance, more particularly to the smaller undertakings, is the assistance which it was possible to render during the coal strike, which enabled them in most cases to maintain the gas supply in their respective areas during the time of trouble.

An important innovation during the year was the revival of discussions of technical matters appertaining to works and district plant; and it is hoped that every member will do his best to maintain the high standard which has been set in regard to the matters coming under this head.

The following members were elected as District Officers to serve during the coming year:—

Chairman.—Mr. P. S. Hoyte.
Vice-Chairman.—Mr. James Taylor.
Committee.—Messrs. J. Armstrong, J. H. Cornish, C. G. Dawson, J. Harger Pye, H. E. Riley, R. Robertson, W. P. Tervet, E. P. Vince, and J. Wesley Whimster.
Hon. Secretary.—Mr. W. E. Dean.
Representative Member on the General Committee.—Mr. R. Robertson, in succession to Mr. P. S. Hoyte, retiring by rotation.

Finally, on looking back over the year's work, it is felt that the Association has been of valuable assistance to its members; and with hearty co-operation the future success of the Western District is assured.

J. WESLEY WHIMSTER,
Chairman.

NEW MEMBERS.

The following six new members were elected, on the proposition of Mr. BOTLEY, seconded by Mr. A. CADDICK (Croydon):

Mr. Daryll James Branson, of Faversham; Mr. Percy Edward Browne, of Brighton; Mr. Henry Gage, of Sutton (Surrey); Mr. Frederick Norman Howes, of Rotherhithe; Mr. Hector Keene, of Bournemouth; and Mr. Robert Henry Ruthven, of Ramsgate.

REPRESENTATIVE ON THE COUNCIL OF THE INSTITUTION.

Mr. BOTLEY proposed, Mr. R. BEYNON (Torquay) seconded, and it was agreed, that the representative of the Association on the Council of the Institution of Gas Engineers be Mr. Campbell.

THE NEW PRESIDENT.

Mr. BOTLEY said his next duty was a very pleasant one. He did not suppose that it often fell to the lot of a President to have to induct two successors in office; but this was so in his case. Those who had been present at the luncheon knew what Margate thought of Mr. Campbell, who was now to be President of the Association. He had great pleasure in asking Mr. Campbell to take the chair; and he was perfectly well assured that in his keeping the interests of the Association would be safe, and that at the end of the year they would acclaim Mr. Campbell's services as having been worthy of their traditions.

Mr. CAMPBELL, who, on taking the chair, was received with applause, thanked the members for their kind reception, and said he would use every endeavour to carry out his duties to their satisfaction. The first of these was to tender a hearty vote of thanks to Mr. Botley for having carried on the good work in the way he had done in the absence of Mr. Whimster, and then to move a similar vote of thanks to Mr. Whimster for his services in the chair during the past year, which was one of the most successful years the Association had had. Mr. Whimster had proved a most genial President; and, in addition to this, he had not missed any Committee meetings during the year. Then there was the work he did in arranging the successful visit to Bath last September, which would go down to posterity as one of the happiest events in connection with the Association for many years past. But if nothing else had marked his year of office, there had been the excellent paper which he had secured from Mr. W. J. Sandeman last November. This was a classic on distribution. In conjunction with their hearty thanks, he moved that the Secretary be asked to communicate to Mr. Whimster their best wishes for a speedy recovery to health.

Mr. BOTLEY seconded this, and endorsed all the President had said as to Mr. Whimster's services.

The resolution was heartily passed.

Mr. J. M. CAMPBELL then proceeded to deliver his

INAUGURAL ADDRESS.

After thanking the members for his election, and referring to the difficulties of preparing a Presidential Address, with a Technical Press which keeps the industry so well posted, he said: Now that the several bodies representing the industry are housed under one roof, perhaps some co-operation may result, so that their meetings are better co-ordinated than in the past, and thus minimize the time spent by us in that way. Far be it from me to suggest that all of these meetings are not essential; but they are so frequent, and follow one another so closely, that attendance does occasionally become a tax, and leads to the suggestion that perhaps some system (such as a permanent Joint Committee of the Secretaries) might be devised to deal with the question. The magnificent service being rendered by the National Gas Council, the British Commercial Gas Association, the British Sulphate of Ammonia Federation, and others, is inestimable; and, indeed, I am firmly convinced that, were it not for the continuous attention given to the industry's needs by these bodies, each so capably organized and efficiently controlled by the responsible chief and permanent staff, the gas profession would be in a much less virile condition to-day than it is—more especially when one takes into consideration the constant and determined boosting given officially within recent years to our worthy competitor.

I am not altogether sure as to the actual value to either the industry or the members of a District Association of the formal Presidential Address, and if it be really worth the time and labour spent in its preparation, except to the individual principally affected (to whom it is a real source of education—and other things!); and I incline to the opinion that within the near future the custom may be discontinued. I should, however, hasten to add that this expression of view must not be taken to apply to the Presidential Address eagerly looked forward to year by year from the Chair of the Institution of Gas Engineers, but refers merely to the District Senior Associations. I have in mind the remark of an engineer much respected, and with exceptionally wide experience, who looked upon the District Association meeting when the address by the President was read as the least interesting of all gatherings.

TRAINING OF JUNIORS.

The excellent and inspiring addresses (and articles) which are presented from time to time by our juniors at their several Associations are portents of the industry's future vitality; and I certainly except them from the opinion just expressed as to the value of Presidential Addresses. Originality in any particular direction usually indicates the person who is predestined to success; and our careful handling and training of the individual youth with whom we may each come in contact will have much to do in moulding him into the man he will eventually become, and who will ultimately be our successor. It is of the utmost importance that we should welcome any original views by our subordinates, encourage them to voice their opinions, and give them the practical opportunity (within reasonable limits) of showing whether they are wise or otherwise. The men who will have the control of the destinies of our industry in two or three decades are unknown, but yet are with us being trained to-day. It is our duty, therefore, to equip them efficiently for the future posts which they will occupy, so that they may satisfactorily fill them with honour to their profession and credit to their predecessors.

After some further remarks on the subject, the President proceeded: It is a matter for congratulation that the industry yet possesses those budding enthusiasts connected with our Junior Associations who surprisingly enough have apparently either fared better in their initial opportunities than many or are happily gifted with the capacity to rise supreme to their surroundings, and will not allow their ardour for the profession in which they have staked their future hopes to be damped. The youth of to-day must himself seek by diligence, initiative, concentration, and determination to qualify for the loftier posts, though it is somewhat unfortunate that one hears nowadays the plea advanced that none can succeed without influence. But I venture to suggest that the reverse is more correct—that permanent success is more likely to be attained by merit with a spice of luck. He must not forget that the man who can do him most good is he who is inside the clothes he is wearing. Influential backing most assuredly will follow as a natural result the evidence of worth; but the aspiring junior must prove himself worthy of support to

command it first and then retain it, whereas influence *minus* ability cannot long remain successful.

CARBON MONOXIDE.

The new era inaugurated by the Gas Regulation Act, with its opportunities, gives rise to the certainty that history during the coming years will be distinctly made by the progressive and enterprising gas engineer, unless curtailed by some such ridiculous but mischievous attitude as was recently adopted by certain authoritative persons and newspapers regarding carbon monoxide—with the natural effect on public opinion, which, as I read recently, is a "mysterious compound of individual and collective thought, often misunderstood and misapplied." Public opinion is, however, able to exert considerable influence on, and distort the minds of, our consumers, with the result that through any such absurd allegations some serious disadvantage might unfortunately accrue to the progress and development of the gas industry, besides being inimical to the public interest.

In this connection, it seems to me that on all such occasions some official announcement should immediately be made on the industry's behalf to allay suspicion, dispel doubts, and answer the charge. The question as to the carbon monoxide content in the gas now being distributed has been so ably and fully dealt with by Mr. Milne Watson, Dr. Carpenter, and others at the recent annual general meetings of their respective companies that little remains to be said by me which would advance new arguments favourable to the retention of the existing condition of affairs. Suffice it to say that the Committee at the exhaustive inquiry into the subject arrived at the conclusion not to limit the CO content, solely on the strong evidence adduced; and no other decision could possibly have been arrived at. It is much to be regretted that the result of such an impartial and critical Committee should have been the subject of an attack by those whose sound judgment on and extensive knowledge of such matters should have convinced them of the justice and fairness of the Committee's views. One cannot quite understand their vision being so obscured; but it seems to indicate that these critics are actuated by some other sentiment than friendliness to the gas industry.

Leakages of gas, however small, ought at all times to be promptly attended to and made tight; but this has always been advocated, and is no new phase. Any danger arising from the resumption of the gas supply through a prepayment meter, following on its suspension by the previous prepaid quantity having become exhausted, can be avoided by the exercise of ordinary care. Users of this type of meters are nowadays aware that the supply is re-established by resuming payment; and surely it is an obvious duty devolving on them to see that all points are either safely re-lit or turned-off. The possibility of a catastrophe occurring might, however, be entirely obviated by inserting an automatic device immediately preceding the burner, whereby the supply would be maintained so long only as the pressure existed, and could not be resumed (even with the renewal of the meter) until again personally put into operation. Such a device was invented and patented by the speaker and a local friend some years ago; but difficulties in its manufacture during the war caused its being abandoned. A few specimens are here for inspection.

GAS REGULATION ACT ORDERS.

The recent discursive letter by Mr. H. E. Jones, with its accompanying statement comparing the new standard price per therm with the original standard price per 1000 c.ft. converted into therms, in respect to the Metropolitan and certain Suburban Companies was particularly apt, and is fairly supported in the Order granted to my Company, where the new standard price of 17·6d. per therm represents an increase of 7·6d. on the original standard price of 4s. 2d. per 1000 c.ft., equalling 10d. per therm on a 500 B.Th.U. basis. In reviewing the Orders which have been issued by the Board of Trade under the Gas Regulation Act up to Feb. 28, the following analyses indicate the additional amounts that have been granted on original standard or maximum prices worked out on an initial basis of five therms per 1000 c.ft.

The converted "therm" standard or maximum price (in the second column), *plus* the extra amount conceded by the Board of Trade, supplies the figure named in the Order included. Maximum and minimum figures, as well as averages, can thus readily be obtained on any original standard or maximum price covered by the statements. It will be observed that the largest addition so far conceded to a sliding-scale company under the Act is 12·2d. on a 3s. 2d. standard; while the lowest addition is 4d. on a 5s. standard. As to maximum companies, the highest sum granted is 11·6d. on a previous 4s. 6d. and the minimum 3·2d. on a 7s. original figure.

That there is not wider disparity between the relationship of these additional amounts is surprising, since they include Orders granted to all undertakings irrespective of their size or location. It might be supposed that, being situated in a mining district and utilizing coal from adjoining pits, the extra costs beyond the control of the management (and incurred since July, 1914) would be so much less in the case of such an undertaking that the increment per therm, added to the original price, might be largely reduced compared with those companies whose spheres of operation are at a considerable distance, involving the incidental transport charge, wagon hire, &c., beyond the universal increased coal cost. Examination of the tabulated figures, however, clearly testifies to the extreme care bestowed on each application by the Board of Trade, despite the enormous number showered upon them and the vast amount of investigation involved.

There appears to be a premonition in the minds of some engineers that an adjustment in the earlier Orders may be made in the near future by reason of a possible reduction in expenditure since the issue of the Order compared with that ruling when consideration was given to the application. It will be found that the Orders of an earlier date do not appear to show any very substantial proportionate difference from those more recently issued. This may be accounted for by the fall in residuals having followed the reduced expenditure, which will more or less rectify the conditions existing when making the application and as they appeared in the original detailed schedule. Should, however, there be any question of revision, either suggested officially by the Board of Trade or promoted by a local authority, which might be caused by a distribution of dividends at a higher rate than that authorized under the pre-war conditions, it must always remain a matter for argument by the Company concerned as to the causes contributing towards the improved circumstances. Should these be clearly attributable to betterment by reason of either new plant, improved working results, more careful administration or technical skill, or all of these, it would be manifestly unjust to withhold

TABLE I.

Standard Price.		Additional Amount in Pence making new Standard Price per Therm.																															Totals.
Per 1000 c.ft. (Original).	Converted to Therm Basis at 500 B.Th.U.	12·2	11·4	10·8	10·4	10·0	9·6	9·2	9·0	8·8	8·6	8·4	8·2	8·0	7·8	7·6	7·4	7·3	7·2	7·0	6·8	6·6	6·4	6·2	6·0	5·8	5·6	5·4	5·2	5·0	4·8	4·6	4·4	4·2	4·0	
s. d.	d.																																			
5 3	12·6	..	..	..	..	..	..	..	.	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	.	..	..	..	..	..	..	..	1
5 0	12·0	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	2	..	..	..	1	6
4 9	11·4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	3
4 8	11·2	..	..	..	..	.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	.	..	..	..	..	..	..	1
4 7	11·0	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	2	1	2	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	8
4 6	10·8	1	..	..	..	..	..	..	.	1	..	..	..	1	1	..	3	..	..	..	..	..	..	1	1	..	..	1	..	..	..	..	..	1	..	11
4 4	10·4	..	..	..	..	1	..	..	..	1	..	..	1	..	..	..	..	..	..	.	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	5
4 3	10·2	..	..	..	..	..	1	..	1	..	..	..	1	1	1	..	..	..	..	..	..	1	..	..	..	1	..	..	1	..	..	..	..	..	..	8
4 2	10·0	..	..	..	..	..	..	..	.	..	..	..	..	..	..	1	..	..	2	..	1	.	..	..	..	..	..	..	..	..	..	..	..	..	..	4
4 1	9·8	..	..	..	..	..	1	..	..	..	..	..	..	1	..	..	..	2	.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.	4
4 0	9·6	..	..	..	1	1	..	..	..	..	..	..	1	1	..	2	1	..	1	1	1	..	1	1	1	3	..	..	..	..	..	1	.	1	18
3 11	9·4	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
3 10½	9·3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
3 10	9·2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	2
3 9	9·0	..	..	..	..	..	..	..	..	1	..	1	..	3	..	..	..	1	1	..	..	..	..	1	..	..	..	..	..	1	..	..	1	..	1	11
3 8	8·8	..	..	..	..	.	..	..	..	1	1	..	..	..	..	1	1	.	1	..	..	.	..	..	..	..	..	..	..	..	..	..	..	..	..	5
3 7	8·6	..	..	..	..	..	..	..	..	..	..	.	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
3 6	8·4	..	..	1	..	..	1	..	..	..	2	1	..	3	1	1	1	..	..	2	1	4	..	1	..	1	..	..	2	1	..	..	..	..	..	23
3 4	8·0	..	..	..	..	..	..	2	..	..	..	2	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6
3 3	7·8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	1	..	..	1	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	6
3 2	7·6	..	1	..	..	..	..	..	..	..	.	..	..	..	..	3	1	..	1	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	8
3 1	7·4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	1
3 0	7·2	..	..	..	..	..	..	..	..	..	..	..	..	..	.	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	3
2 11	7·0	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
2 10	6·8	..	..	..	..	..	..	..	.	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	.	..	..	..	..	..	..	2
2 9	6·6	..	..	..	..	..	..	..	..	..	..	1	..	..	1	..	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	4
2 6	6 0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1
2 3	5·4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
2 1	5·0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Totals . . .		1	1	2	1	2	1	4	1	6	3	6	3	10	6	13	12	1	13	9	6	7	2	8	6	7	2	1	3	2	3	1	2	1	3	149

TABLE II.

Maximum Price.		Additional Amount in Pence making new "Maximum" Price per Therm.																								Totals.
Per 1000 C.Ft. (Original.)	Converted to Therm Basis at 500 B.Th.U.	11·6	10·2	9·4	9·2	9	8·8	8·6	8·4	8·2	8	7·6	7	6·8	6·6	6·4	6·2	6	5·8	5·2	5	4·8	4·6	4·2	4	3·6	3·2	
s. d.	d.																											
7 1	17·0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1
7 0	16·8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
6 6	15·6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
6 0	14·4	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1
5 10	14·0	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
5 6	13·2	..	..	..	..	..	1	..	..	..	..	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	3
5 0	12·0	..	..	..	1	1	..	..	..	..	2	..	1	..	..	1	..	1	1	1	1	1	..	1	..	..	..	12
4 9	11·4	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
4 7	11·0	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
4 6	10·8	1	..	..	..	..	..	..	..	1	..	..	1	..	..	..	2	..	..	2	..	..	..	..	..	..	..	7
4 4	10·4	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
4 3	10·2	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
4 2	10·0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1
4 0	9·6	..	..	1	..	..	..	..	..	1	..	1	..	..	1	..	1	..	2	1	..	..	..	..	..	..	..	8
3 9	9·0	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	..	..	..	..	1	..	..	..	..	..	..	3
3 6	8·4	..	..	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	4
Totals . . .		1	1	2	2	1	1	2	1	2	3	3	4	2	1	2	3	2	4	4	3	1	1	1	1	1	1	50

from the stockholders the benefits of dividends increased beyond those ruling in 1914; and any revision arising from a claim made on this account should be met with strenuous resistance.

Permission to gas companies to hold annual meetings instead of half-yearly, as had hitherto been compulsory in many cases (although not in ours since 1898), gives rise to a matter which I think is deserving of some consideration by the National Gas Council with perhaps a reference later to the Board of Trade—viz., that in many cases any reduction in the price of gas made in any intermediate quarter does not carry with it the prescribed right to increase of dividends; the latter being dependent on the highest rate for gas charged during the currency of that year. This disability might conceivably, though unwisely, prevent the benefit of a reduction in price being made as soon as might be, in view of there being no corresponding advantage to the proprietors; and, as previously suggested, the anomaly might be redressed by representation to the Board of Trade to secure the distribution of dividends being governed by the average price ruling during the particular year under review.

DECLARED STANDARDS.

The calorific standard of gas to be declared under the Gas Regulation Act should not be a difficult one, at the present time at least, to decide, inasmuch as our recent enforced experiences with lower-grade gas, together with the conditions, character, and capacity of both our manufacturing and distributing plant, will necessarily clearly indicate the quality best suited at the moment to the circumstances of the undertaking and the needs of the consumer. In this connection it is interesting to note the declarations made—

Up to and including Feb. 28, 1922.

Calorific Value Declared.	Number of Declarations.	Calorific Value Declared.	Number of Declarations.
400 ..	2	480 ..	18
410 ..	1	490 ..	2
420 ..	1	500 ..	29
425 ..	6	520 ..	1
430 ..	1	530 ..	1
450 ..	66	540 ..	1
460 ..	22	550 ..	2
470 ..	20		
475 ..	17	Total .	190

Since compiling the above, two other companies have amended their declarations from 500 and 425 B.Th.U. to 450 B.Th.U. It will be observed that the high proportion of 66 (representing nearly 35 p.ct.) have decided on 450 B.Th.U. gross per cubic foot as their declared value. Probably the fact that this figure has frequently received the blessing of Government Departments in the past (and without incurring the opposite sentiment from the consumer) has in some degree contributed towards arriving at these decisions. It seems to me strange, however, that such calorific value should have been determined by many of the smaller undertakings who are known to be able to manufacture only straight coal gas, and in not a few instances even with distributing mains which, with higher qualities of gas, gave rise to deficient supply. In their case a rather higher quality might have been more to their interest and have taxed their distribution system less, unless the present condition of their carbonizing plant prevents them from declaring a higher value; and perhaps coincident with the rectification of these circumstances, the provision of some type of water gas or total gasification plant may be contemplated later to enable the present declared standard of quality to remain unaltered.

There can be no doubt that the cost of distribution with gas of a lower heating quality must inevitably be comparatively greater per therm than when supplying gas of a higher calorific value. This may be compensated for, however, in a pecuniary sense by the added equivalent obtained on the manufacturing side, although even in this connection the capacity of the works plant to cope with it must receive the utmost and most careful consideration. It is possible that, in certain circumstances; the value of the added therms per ton of coal with a lower calorific standard might be more than dissipated by its involving heavy capital expenditure, or through increased labour charges, on the works to deal with the extra quantity of gas being produced, even although the station governors, distributing mains, services, meters, &c., are ample for the purpose of conveyance and delivery. There seems, therefore, to be sound wisdom in the view generally held to continue to supply gas of a quality fairly consistent with that recently distributed, and with which our consumers have had satisfactory experience.

My Company declared a calorific standard of 460 B.Th.U. gross per cubic foot as from Dec. 20 last, as our experiences in the past show that the distribution of gas of this quality gave rise to fewer complaints than one of either a higher or lower figure. It also suited our resources, and enabled a continuity of our working operations throughout without change, besides affording satisfaction to our consumers. My Directors therefore rightly felt it politic—meanwhile, at any rate—to make no alteration.

VERTICAL RETORTS.

My Company do not make any carburetted water gas. Our main manufacturing plant consists of an installation of Woodall-Duckham continuous vertical retorts, capable of carbonizing 100 tons of coal per day, which are supplemented during some portion of each normal year by inclined retorts of similar capacity. We were fortunate, in point of initial outlay, to have these vertical retorts erected and in operation before the outbreak of the war. In another connection, too, fortune smiled on us, as it was mainly due to the capability of these retorts to maintain gas-making continuously in the dark, during the long weary nights of hostile air attacks or warnings, that our consumers never suffered through partially depleted gasholders. Owing to the imperative necessity for enforcing drastic measures not only to subdue but absolutely obliterate all light on these numerous occasions, gas manufacture by horizontal or inclined retorts was prohibitive, being not only risky but practically impossible; and all other undertakings in South-East Kent (unless provided with excess storage) were obliged more or less seriously to restrict their supply of gas on the days following the visits of the night-raiders. I do not, however, suggest that in consequence it would be desirable for the members to consider installing continuous verticals in order to be prepared to maintain uninterruptedly the process of gas manufacture during the air raids of the next war!

Facilities for steaming were not provided when our vertical installation was erected, as possibilities in this direction were not then realized. Experiments were made by us later, but with negligible success, due mainly to the temperature of the outgoing coke being too low to perform the necessary reaction with the ingoing steam, which, unfortunately, has to be conveyed a considerable distance from our boilers. In 1920, certain alterations of a slight character were carried out, whereby the heat in the coke discharged was sensibly raised by discontinuing the pre-heating of the primary air, which retained the heat in the coke and rendered the steaming process much more effective. Steam, superheated by being carried through the waste-gas flues, has for the past eighteen months been fairly constantly admitted through the wall of each retort, some 18 ft. below the top, through a 3-16 in. nozzle at a steady pressure of 23 lbs. per sq. in.—representing 45 lbs. per retort per hour, or, roughly, some 8 p.ct. on the weight ot coal carbonized. This we find to be the maximum at which we can satisfactorily operate with our available plant conditions without reducing the calorific value of the resultant gas below 465 to 470 B.Th.U., at which figure we aim at maintaining the quality. These arrangements have followed our prolonged experimenting and testing, when carbonizing Durham unscreened

Table III.

Year.	Therms made Per Ton (Corrected to Standards).	Carbonizing Wages Per Therm.	Carbonizing Wages Per 1000 C.Ft.	Coals Carbonized.	Remarks.
		Pence.	Pence.		
1913 . . .	62·53	·38	2·05	59 p.ct. Durham U/S. 41 ,, Yorkshire Nuts.	Inclined and horizontal retorts (hand-charged). Proportion of gas made 49 to 1 respectively.
1914 . . .	64·15	·22	1·12	64 ,, Durham U/S. 36 ,, Yorkshire Nuts.	Vertical and inclined retorts. Proportion of gas made 5 to 1 respectively.
1915 . . .	65·50	·21	1·01	74 ,, Durham U/S. 26 ,, Yorkshire Nuts.	Vertical retorts only.
1916 . . .	62·43	·26	1·24	63 ,, Durham U/S. 37 ,, Yorkshire Nuts.	Vertical retorts only.
1917 . . .	60·39	·38	1·80	50 ,, Durham U/S. 33 ,, Yorkshire Nuts. 2 ,, Yorkshire U/S. 15 ,, Derbyshire.	Vertical and inclined retorts. Proportion of gas made 2 to 1 respectively. (Repairs to vertical plant.)
1918 . . .	58·42	·39	1·73	2 ,, Durham U/S. 23 ,, Yorkshire U/S. 60 ,, Yorkshire Nuts. 15 ,, Derbyshire.	Vertical retorts only.
1919 . . .	62·19	·50	2·25	23 ,, Durham U/S. 27 ,, Yorkshire Nuts. 41 ,, Yorkshire Coals. 9 ,, Derbyshire.	Vertical and inclined retorts. Proportion of gas made 12 to 1 respectively. Experimental steaming at intervals.
1920 . . .	64·08	·80	3·68	38 ,, Durham U/S. 18 ,, Yorkshire Nuts. 44 ,, Yorkshire Coals.	Vertical and inclined retorts. Proportion of gas made 3 to 1 respectively. Alteration to primary air flues to facilitate steaming. (Early part of year.)
1921 . . .	63·40	·73	3·33	2 ,, Durham U/S. 15 ,, Foreign. 34 ,, Yorkshire Nuts. 49 ,, Yorkshire Coals.	Vertical and inclined retorts. Proportion of gas made 7½ to 1 respectively.

coal, which, may I say, is not the most satisfactory material for steaming.

Except for a slight reduction in the amount of coke available for sale, we have not found that steaming has any detrimental effect; while the value of the coke as a saleable product is, if anything, improved, owing to its appearance being more silvery than that made when working under straight coal gas conditions; and, by reason of the periods between scurfing being longer, the retort hours lost are obviously lessened, and the total average output from the plant is consequently enhanced. With modern steaming arrangements and a plant suitably designed, the proportion of steam mentioned above would be very considerably increased, and the periods of scurfing would also be at much wider intervals than has been our experience, with its additional influence on the benefits accruing in respect to output.

THERM PRODUCTION, &c.

The production of the greatest possible number of therms per ton of coal carbonized, with gas of the most suitable quality and at the cheapest possible rate, is the aim of all progressive gas engineers; and I have been constrained to prepare an abstract from our records during recent years to ascertain how the therm production of the past few years compares with that of the present. I append this, showing our results and other data since 1913.

Some of my audience may possibly view the therm productions embodied in the foregoing statement as unworthy of publication; but they have at least the supreme virtue of being true, and cover the space of a year in each instance. Not only is it necessary to recognize the circumstances operating against us in this unfortunate corner, but consideration must naturally be given to the variety and character of the coal carbonized during the period (and more particularly during the war years), as well as the system and age of the carbonizing plant employed.

In 1913, before the erection of our vertical retorts, and despite the partial use of old-fashioned and wasteful horizontals, but when the coals carbonized were of pre-war quality, the make of therms averaged 62·53, improving the following years on account of the new plant, but in the subsequent war years becoming modified by reason of the quality of the coal, which left much to be desired in every respect. Production results when verticals only were in operation over the full twelve months appear in 1915 and 1916. There is a marked diminution in the second year, which may be traceable to inferior coals as well as the added life of the installation. During the autumn of 1917, the vertical retorts (after having done fully three-and-a-half years' work) were rebuilt from an average depth of 7 ft., occupying four months, when our inclined retorts alone were employed. The therm equivalent per ton shows a further reduction due to the verticals being in bad condition and the character of the coals suffering additional deterioration; while the lesser production of therms by the inclined retorts also affected the average results over that year.

The low-water mark in the multiple of quantity and quality was reached in 1918, when, strangely enough, the vertical retorts were only in their first year of work after resetting; and as all our gas that year was made by them, to the coal factor alone must be attributed the cause. The exhaustive steaming experiments which were afterwards undertaken resulted, as will be seen during the next two years, in a gradual but marked improvement in the direction of therm production, although the benefits due to the alteration effected in 1920 would be somewhat minimized by the employment of the inclined retorts for fully six months. It will be recollected that from the Armistice onwards coals were slightly less inferior; and this must be regarded as a factor assisting in realizing the better results recorded for the past three years. Having regard to the condition of our vertical retorts after four-and-a-half years' working, and that our "inclineds" were employed in varying degrees for 34 weeks, also the additional and very important fact that some 15 p.ct. of the coal carbonized consisted of most inferior imported "black" material—of which we all have said so much and thought more!—our last year's figures are, I venture to think, not altogether discomforting.

The table shows that our carbonizing costs per therm amounted to 0·38d. in 1913, whereas in 1915 and 1916, when verticals alone were in operation, the corresponding figures (including minor wage advances) were only 0·21d. and 0·26d. per therm respectively. Of course, those costs have, as is our common experience, been considerably appreciated consequent upon the higher rates of pay to stokers and others engaged in the carbonizing department. This is apparent in 1920, when the carbonizing wages amounted to the maximum of 0·80d. per therm, which cannot but be regarded as a satisfactory figure.

"Carbonizing Wages" include the carbonizing foremen, all operators and stokers within the retort-houses, engine and exhauster men, coal plant operators, and boiler men. It is necessary to state that twelve-hour shifts were in operation with all these shift men up to October, 1919, when, by the introduction of the eight-hour shift, a proportionately increased number of men naturally became at once involved with each, at the increased rate of pay then ruling.

The particulars given under the heading of "Coal Carbonized" will afford interest to those Doubting Thomases who look upon continuous vertical retorts as incapable of carbonizing Durham unscreened coals; and I can add my testimony to that of others who have stated that there is no insuperable difficulty in dealing with this coal in these retorts. We have over long periods carbonized nothing else, and, while it would be a terminological inexactitude to state that they were manipulated with an equal amount of ease to that of first-class South Yorkshire washed nuts, still, with the aid of a little extra rodding and timely attention to aid their passage through the retort, no serious obstacle arose in our case against their effectual and efficient carbonization. Our greatest difficulty usually occurred when the Durham unscreened coal consisted of material of an especially high bitumen content; the obvious tendency then being for the charge to hang-up, unless particular care was given by the top operators to keep it on the move.

VERTICAL RETORT MAINTENANCE.

The cost of upkeep of continuous vertical retorts has from time to time exercised the minds of many engineers; and I have already mentioned that during the year 1917 our settings were cut down to an average depth of about 7 ft. (constituting the portion showing evidences of disrepair and need for renewal) and again rebuilt on the original lines. This work was carried out at a time when the cost of refractory materials was obviously abnormally high, and involved my Company in a total cost of £1873. Certain other small matters connected with the coke-lift to the top hoppers, the ironwork at the top and bottom of the settings, besides repairs or renewals to ashpans, drip-plates, hoppers, and shoots, were carried out by ourselves during the period from the starting-up of the installation on Feb. 1, 1914, until it was let-

down on May 28, 1917 (1212 days), at a total cost of £132. This sum, added to the above cost for reconstruction, brings the total expenditure to £2005; and as the quantity of coals passed through the retorts during that period amounted to 76,880 tons, our cost of repair and maintenance worked-out at 6·26d. per ton.

Since their reconstruction they have been constantly at work from Oct. 18, 1917, until now, with the exception of the short period when each of the five beds was discontinued for 28 days in 1920 to carry out the alterations previously described. Consequently, their period of work (up to Feb. 28 inclusive) represents 1560 days, and, with a coal throughput of 101,830 tons, their need for repair is now evident. The contractors (the Woodall-Duckham Company) have submitted to us their tender of £3025 for this repair and renewal of the complete bench to a similar average depth of 7 ft.

It will be recognized that the renewal of parts of the coal-handling plant, engines, lift, elevators, shafting, &c., would naturally be less heavy during the period immediately following their installation than after a previous three-and-a-half years' service; and this is evidenced by the charges incidental to maintaining the mechanical equipment during the second run, reaching £492. I should like to add that during the whole eight years' period of operation, no part of the Babcock-Wilcox gravity bucket elevator has required renewal, although 178,710 tons of coal has been elevated and conveyed by it. This is an excellent record of service, the more so as that firm's inspector has reported that he cannot see much need even now for more than a mere overhaul. The foregoing figure of £492 on the coal tonnage handled of 101,830 is particularly small, representing only 1·16d. per ton, which, added to the firm quotation of the contractors for the reconstruction of the settings and the cost of the 1920 alteration, gives a total of £3819, or only 9d. per ton of coal carbonized. The following statement shows the figures of the two periods separately and together, from which it will be seen that 7·82d. per ton of coal carbonized represents the entire repair and maintenance cost over the whole time.

Cost of Repairs to Woodall-Duckham Vertical Retorts.

1914–1917.

	Per Ton.	Total.		
Reconstruction of settings (1917) . . .	5·85d.	£1873	8	4
Renewals and repairs to lift, ashpans, drip-plates, hoppers, shoots, &c. . . .	0·41d.	132	0	0
		£2005	8	4

Coals passed through, 76,880 tons.
Costs per ton, 6·26d.
Working for 1212 days.

1917–1922.

	Per Ton.	Total.		
Reconstruction of settings, firm tender submitted (1922)	7·13d.	£3025	0	0
Actual cost of brickwork repairs (1920) .	0·71d.	302	0	0
Various ironwork and machinery renewals, &c.	1·16d.	492	0	0
		£3819	0	0

Coals passed through, 101,830 tons.
Costs per ton, 9d.
Working for 1560 days.

Summary.

1914–1922.

	Per Ton.	Total.		
(1) Reconstruction of settings only . .	6·98d.	£5200	8	4
(2) Repairs, &c., of machinery, &c. . .	0·84d.	624	0	0
	7·82d.	£5824	8	4

Coals passed through, 178,710 tons.
Costs per ton, 7·82d.
Working for 2772 days, taken only to Feb. 28.

It must be observed that no amount is included for the present renewal or repair of any top or bottom ironwork or to the lift, engines, or conveyor; but I am of opinion that, in the most extreme case, these could be well covered by an allowance of (say) £400. This would accordingly increase the total charges from the foregoing figure of 7·82d. per ton to that of 8·36d.

Owing to our seasonal demand, two out of the five beds must remain under fire until (at least) the beginning of October, thus adding 214 days to the records of service, and making 1774 days without repair. The maintenance costs will manifestly be improved by this in so far as those for the second and entire periods are concerned; while the quantities of coal will have been carbonized and without any increase in the contractors' estimate.

In reviewing the foregoing data, regard must be had to the conditions ruling during the periods, since, while the cost of repairs and maintenance over the second run exceeds by about 45 p.ct. that of the first, it must be stated, in justice to the contractors, that the price of refractory material had in the interval advanced enormously, with substantial increases also in labour charges. The expenses relative to transport, in view of our geographical situation, involving in some instances amounts equivalent to the original cost of the material, must also be taken into account in comparing similar costs for repair and maintenance of carbonizing plants elsewhere, even during the same period. On the whole, I think the figures must be regarded as very creditable, more particularly when, in comparison with our inclined retort bench, 4½d. per ton of coal carbonized was the average cost of maintaining them in pre-war days.

VERTICAL RETORT CONSTRUCTION.

The vertical retort installation has been in work practically continously from the beginning of 1914 without any repairs whatever to the lower portions of the bench; but our war experiences, when enemy messages from the air in the shape of heavy bombs caused considerable local jarring with its resultant effect on heavily constructed plant, brought about bye-passing between the flues. The cost of remedying these leakages would entail a vastly increased amount of cutting-out and expense without greatly improving the working results, owing to the settings having been constructed on Woodall-Duckham's original model. My Directors consequently have just given attention to the larger question of entirely demolishing the existing settings, renewing them within the existing steel framework, but on their most modern lines, with steaming facilities, and enabling the benefits due to the developments in their system of continuous verticals to be secured. An increased sum beyond that mentioned to effect renewals only to the depth of 7 ft. would obviously be involved; but, on the other hand, the advantages in working costs and results would more than compensate, as the number of therms to be produced per ton of coal carbonized is guaranteed at 83—as against 65½, our previous best with our existing plant alone—with an entirely new installation provided on the same ground area, and all the existing iron and steel framing again utilized to minimize the expenditure. My Directors have therefore decided to adopt this scheme. The work of demolition of three out of the five beds has just been commenced with a view to their entire reconstruction before our heavy season's demand; while it is proposed that the remaining two shall be similarly dealt with in October, immediately following the termination of our season.

Our past experience with continuous vertical retorts has led me therefore to recommend my Directors not only to continue in this direction, but to expend an extra sum in renewing them with an improved type of the same system; and I am only too happy to express my satisfaction with the plant installed in 1913 and its operation during the subsequent years. Throughout the period we have never had the slightest regret in the decision then taken to put in Woodall-Duckham verticals. They were less costly at that time to instal than other systems, they occupy less space, they minimize nuisance from smoke and steam emission (which in a popular resort such as ours is so important), they have cost less to manipulate, the working results have been an improvement, they have carbonized coals equally with other types, they were an advantage during the war, and their cost of upkeep has been found to be favourable. The only points about which some little criticism might be levelled is the fuel account, as well as the fact that the temperature of the crude gas is considerably higher than that leaving the hydraulic main of a horizontal or inclined bench.

PURIFIERS.

Our original purifiers consisted of three 24 ft. square by 6 ft. deep boxes, partially sunk in the ground and accommodated under a low roof, with a pit underneath into which the oxide was to be discharged through shoots with hinged lids provided on the bottom plates. Having regard to the fact that a fair percentage of water invariably accumulates in this pit, and that the oxide was removed by a skip and steam travelling crane with open boiler situated on the crane bogey, it will be recognized that this method was rather dangerous, as well as costly and generally impracticable. The result was that the original method was abandoned, and the oxide discharged over the top, wheeled and spread out on the floor adjoining, and the fresh (or revivified) material similarly wheeled to, and tipped into, the boxes when filling, involving a considerable labour cost for purification, more especially as, owing to their inadequate size and being three in number, frequent changes were essential to maintain a clean test on the outlet. For these reasons, alterations were effected in 1911 whereby the existing purifier-house roof was taken off, the columns heightened along one side and a new one built on the other, the roof re-erected and two new elevated luteless purifiers 40 ft. by 20 ft. by 6 ft. constructed along half the house, leaving the other occupied by the existing purifiers, which had, of course, to remain in use. After gas was turned into the two larger ones, the latter were dismantled, the previously mentioned underground pit converted into a liquor tank, and the bottom and side plates of the old purifiers utilized in forming two additional boxes 40 ft. by 20 ft. by 6 ft. on the higher level, coupled to the two new ones. The result is that on the same ground space (important by reason of our total acreage being only three, with an annual make of over 400 millions) we secured further liquor storage of 70,000 gallons, an increase of 100 p.ct. in revivifying space, and an increased purifying area of 85 p.ct., all under the same roof.

To enable the existing cast-iron columns along the one side to bear the added weight of the superimposed columns, their hollow spaces were filled with fine cement concrete. The means adopted to discharge the oxide to the floor underneath is through the usual shoots on the bottom plates; the fresh oxide being hoisted from below in wooden side-tipping skips (steel being so subject to corrosion from hydrated sulphuretted oxide) hooked on to four-wheeled trollies, and run to the required purifier along a rolled steel joist runway fitted with junctions, &c., suspended by means of bridles from the back of the purifier-house roof principals.

Careful calculation of the comparative costs of loading our purifiers by machinery as compared with the existing method of raising by a manual hoist proves that the retention of the present

system results in greater economy, owing to the infrequency of the operation not effecting savings sufficient to justify the change.

ECONOMIES.

The ascertainment of costs relative to certain services as a means of securing possible economies, applies with no little force to "works" matters. I wonder, for instance, how often the glamour attaching to the possession of one's own motor vehicles has caused temporary blindness to the advantage of hiring being probably arranged much more economically—avoiding the large capital outlay without perhaps adequate return, and the necessary provision of a garage. In our case, I have repeatedly found that, after allowing for interest on capital, depreciation, running expenses, overhaul periods, &c., and calculated on the transport duty able to be performed, the cost per ton would have been considerably more than that at which we have been able to hire locally—and without jeopardizing our interests, as we have arranged with our contractors to provide us with our day-by-day very varying requirements on notifying our needs the previous night.

The discharge of coal by hand labour from railway trucks at the station into motor lorries for transport to our works cannot be more economically performed by the adoption of a mechanical conveyor between the truck and the trolley, however much the idea might appeal to one as being more up-to-date.

Our acquisition of small steamers to fetch coal direct from the North to Margate has also been considered from time to time during the past ten years; but at no period has the proposition shown itself to be favourable as compared with the current market rates of freight. This doubtless is affected by our own local circumstances; for vessels can only be accommodated at spring tides (every two weeks), and then to the maximum extent of only some 400 tons deadweight of coal. The compulsory fortnight's interval between the successive visits of any vessel clearly limits its value, and thus may render the proposal untenable, unless or until the purchase cost of suitable vessels becomes much more favourable than it hitherto has been.

The formation of scale in many boilers, involving in its removal the periodical and lengthy cleaning of the boiler, incurs heavy labour costs, besides having a detrimental effect, with likely pitting, on the internal surfaces of the plates and furnace tubes. The difficulty of steaming from unsuitable water can often be advantageously and more economically dealt with by (instead of boiler fluid) the adoption of a paint which interposes a film between the boiler plates and the sediment, thus preserving the former, avoiding the need for chipping, and entirely dispensing with the use of the costly fluid. We have for many years past coated the interior of our boilers in this way; and at the time of its adoption, the advantage afforded to my Company by the change-over from fluid amounted to £50 per boiler per year, besides preventing the continuance of the damage from pitting, which had been exceptionally severe during previous years. The economy being effected now is greater, as the paint we use has advanced little in cost, while labour charges and the price of boiler fluid have in most cases increased considerably.

The mere utilization of the warm water from condensers for feeding boilers results in a considerable saving in fuel account, besides making for smoother working and reducing the quantity of water required to be provided otherwise.

WAR-TIME EXPERIENCES.

I am aware that to many of the members the conditions prevailing during the recent war—when we in south-east Kent received (with undue frequency) first-hand information by air of the enemy's movements—were fairly well known; but I doubt whether the extent to which our area was denuded of its population was fully realized, even by those. The following chart will afford a clear indication of the severity of the shock during the war period to the Company I have the honour and privilege of serving. The upper full line (which may be described as the "blue funk" line) shows the quantity of gas made each year from 1913 to 1921 inclusive; while the dotted and dot-and-dash lines represent the gross and net average cost per ton of coals respectively during the same period, thus indicating by the shaded portion the average return per ton of coal from residual products. The lower full line records the price per 1000 c.ft. charged for gas over the corresponding time.

The tremendous fall in our make of gas is clearly shown, culminating in a total reduction in 1918 of 194 millions compared with 1914. It will also be observed that the return to pre-war conditions was remarkably rapid, indicating no less than 143 millions increase in 1919 over the previous year, with a further rise during 1920 of 65 millions. The gradual, but constant, rise between 1914 and 1919 in the average gross cost of coal per ton is also clearly outlined, with a remarkable jump during the subsequent year, and a moderate rise last year despite the enormous cost of foreign coal, but which was somewhat neutralized by the later reduced cost of the home product. The average net cost of coal per ton, indicated by the lower dot-and-dash line, follows with fair uniformity the advancing costs of coal until 1918; thus showing that residuals as a whole nearly followed the upward trend of the coal market. In 1919, owing to improved returns for these products, the net coal cost fell; and this was further accentuated during 1920, due to the exportation of coke, when my Company realized exceptional prices for certain freights to Scandinavia. The enormous drop in the price obtainable for residuals last year is particularly marked on the chart; while it is noteworthy that, although the revenue from residuals was better than during the war, the net cost of coal remains some five times more costly than in 1913, and the gross cost about three times heavier.

The charge for gas was kept at a most moderate figure for some two-and-a-half years after the outbreak of war, due to substantial stocks of coal in hand, supplemented by supplies under favourable contracts entered into in June, 1914. These were, as it happened, rather fortunate transactions, as the supplies were intended to meet our normal year's requirements; but, owing to the falling output, our needs were served for a prolonged period, with the result that low prices were maintained.

In order to show still further the lamentable effect the war produced on our seasonal output, I have prepared chart No. 2, subdividing the years 1914, 1917, 1918, and 1921 into their respective monthly makes.

The most noticeable feature in this case is that instead of August being our maximum month as usual, it sunk during the year 1917 by no less than 25 millions as compared with 1913. The adverse news coming from the front that year, and continuing through the early part of 1918, is transparent; while the later improved war news is also reflected in the line for 1918. It will be seen that it gradually approaches that of the previous year, passes it in August, and continues to show this excess compared with the previous year until its end. Happily, after the termination of hostilities, our district of supply speedily filled up, which naturally threw an immediate and excessive amount of strain on the resources of the Company, both in so far as materials and labour were concerned. The monthly makes for 1921 are included in chart No. 2 merely for the purpose of comparison with war and pre-war times.

It will be apparent that in view of our inevitable retrogression and the financial embarrassment produced, my Company were obliged to view expenditure with more than the usual keen scrutiny, more especially by reason of the fact that those residents who bravely remained behind were not able in many cases

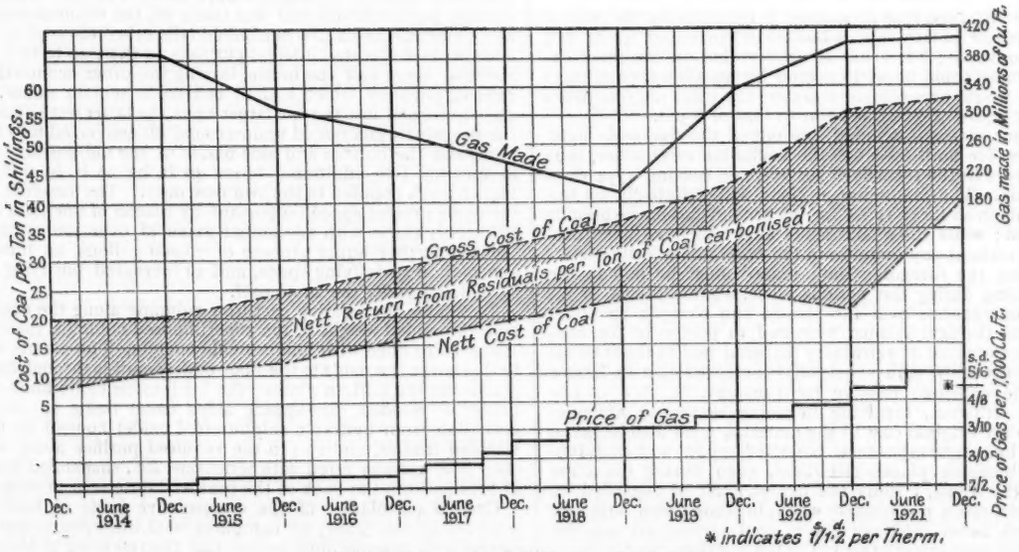


CHART No. 1.—WAR-PERIOD WORKING.

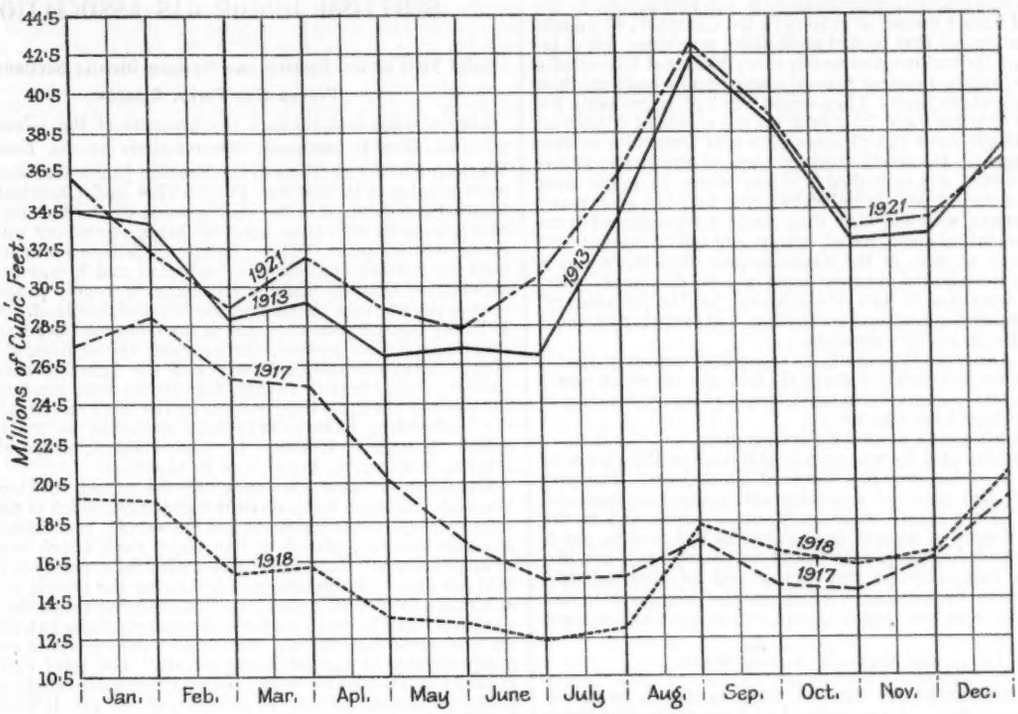


CHART No. 2.—WAR-PERIOD MONTHLY OUTPUTS.

to meet their obligations for even bare necessities, owing to the absence of visitors. It was imperative, therefore, that the price of gas should be kept as low as possible. It will come as a surprise to my audience to be told that gas accounts in considerable numbers were then paid by instalments spreading over lengthy periods; and perhaps I may here be allowed, in passing, to express my sincere appreciation of the incalculable value rendered to a very large proportion of Margate's community, who were enabled only to keep their home together and to exist by the aid of the National Relief (Prince of Wales) Fund. The noble and beneficent assistance which the fund was able to effect in this area cannot be over-estimated; and I am happy to have this opportunity of referring to it.

The dangers surrounding our employees were many, sudden, and severe during the war period; and the loyalty then shown by the major portion of our staff and employees cannot be exaggerated. It is only fair to acknowledge that most of those in our service could have secured more highly-paid work elsewhere, in an infinitely less dangerous zone, had they cared to do so. In order, therefore, to ensure as far as possible the safety of those loyal servants, my Directors constructed a bomb-proof shelter wherein, during those times of frequent necessity, not only our own men (and their wives and families) took refuge, but also large numbers of the neighbouring population.

Perhaps it may be of interest to state that, by reason of our antiquated horizontal retorts not being required, the Ministry of Munitions (Chemical Warfare Section) availed themselves of these for several months, and charcoal was manufactured by us from birchwood, fruit stones, nut shells, &c. Samples of the charcoal were under constant test, and were subjected to gas of a deadly poisonous character in our own laboratory before being accepted for filling into respirators for the Army's use; and my Directors much value an acknowledgment in writing from the Department of the services thus rendered.

The varying character of our normal weekly demand for gas is indicated in chart No. 3, representing last year's records. The enormous peak in August, compared with the other portions of the year, is specially marked; while the Easter draught is clearly defined, with Whitsuntide also shown, but to a much lesser degree, as well as the increase in the make of gas at Christmas time due to the ever-growing influx of visitors to Margate. The effect of these several peaks will convey to the minds of inland gas engineers the extreme difficulty caused in carrying out extensions or alterations, as it limits the period during which these may be conveniently executed, more especially having regard to the additional important factor that Easter and Whitsuntide are movable festivals, varying from year to year, and thus altering annually the time available for dealing with any such matters.

[The remainder of the Address will be published in our next issue.]

A VOTE OF THANKS.

Mr. A. E. BROADBERRY (Tottenham) said he had been asked to propose a very cordial vote of thanks to the President for his address; and he did so with a great deal of pleasure. He had no

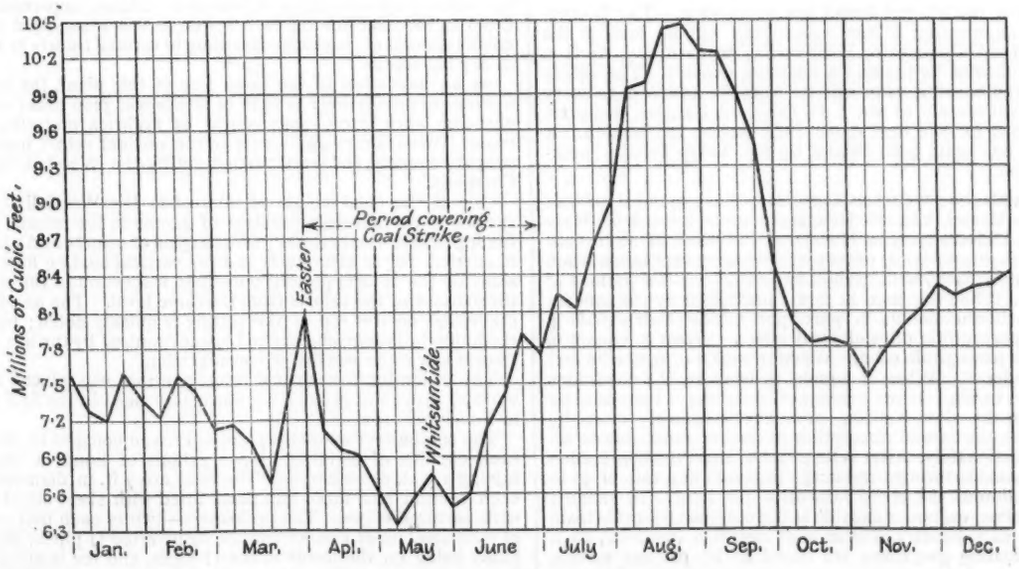


CHART No. 3.—WEEKLY DEMAND IN 1921.

doubt from his personal experience that the preparation of the address had been a matter of anxiety to Mr. Campbell, who might congratulate himself that he had given them something full of interest to all. He had covered nearly everything that interested a gas engineer, and had done it in such a way that he had kept their attention the whole time. They would think of it probably for some weeks to come; and he might see the effects of it later on when they might have the pleasure of a visit from him at their respective works. He might then see some of the ideas put forward by him that day embodied in works where he might least expect to find them. Mr. Campbell had been bold in a great many of his statements, which is what they would have expected from him. He was full of ideas, full of energy, and full of ability; and perhaps it was as well, in the circumstances, that there was a rule that the Presidential Address must not be discussed. Certainly there were one or two things which he (Mr. Broadberry) would very much like to discuss with him; and probably he would do so privately on another occasion.

Mr. A. H. Andrews (Vauxhall), in seconding, remarked that it had been a most interesting address, the full value of which would be still more highly appreciated when they had an opportunity of perusing it in their leisure hours.

The vote having been carried by acclamation,

The President said he was greatly indebted to the members for the way in which they had received his address. The preparation of it had involved a considerable amount of time and labour; and having regard to his many other duties, and to the constructional work at present proceeding, he had had to put it together rather disjointedly. He would be pleased to have Mr. Broadberry's comments at any time; and he thanked Mr. Andrews for his kind remarks, which carried him back to the time when they were not very far apart, and so were able to meet frequently.

Proposed Meeting in the West.

The President said there was one other matter to be raised before they separated. A suggestion had been made that there should be an additional general meeting held in the West this year about September. Since they had divided into Western and Eastern Sections, there had been no such meeting in the West. The Committee had discussed the matter; and it was felt it should be brought before the members. Next year, Mr. Hoyte being President, he expected they would be visiting Plymouth; but this year it would perhaps be advisable that they should have an additional meeting in Exeter.

It was agreed to leave the matter with the Committee.

Unions for Standard Meters.

The President said Mr. Botley had asked him to state with regard to the question of unions for standard meters, that the makers had now agreed to put-on whatever sized unions any individual buyer might want. This, of course, formed a slight correction to the address; and he was glad to take the opportunity of making it.

A Visit to Margate.

The President pointed out that his Chairman, at the luncheon, had very kindly invited the members to visit Margate on May 26, which was a Friday. The Committee had considered the matter; and it was felt that Friday would be better than Thursday, as it would enable those who desired to stay over the week-end. A list of hotels would be included in the notice to be sent out; but he would be only too pleased to give any members who wrote to him such assistance as they might require.

Manchester and District Junior Gas Association.—The twenty-second annual meeting of the Association will be held at the Grosvenor Hotel, Deansgate, Manchester, on Saturday, April 8, and will be followed by tea and a smoking concert. The office-bearers for the ensuing year will be elected; and Mr. J. Berry (the donor) will present to Mr. J. H. Clegg, of Burnley, the prize of two guineas for the best paper read during the session. A similar prize has again been offered by Mr. Berry for the forthcoming session.

Air Contamination by Carbon Monoxide.—The general standards arrived at by Messrs. Yaudell Henderson and Howard W. Haggard, of Yale University, New Haven, as the result of an investigation into the physiological principles governing ventilation when the air is contaminated with carbon monoxide, are (for periods of a few hours): When the time in hours multiplied by the concentration of carbon monoxide in parts per 10,000 of air equals 3, there is no perceptible physiological effect. When it equals 6, there is a just perceptible effect. When it equals 9, headache and nausea are induced. When it equals 15 or more, the conditions are dangerous to life. If the volume of breathing is increased by exercise (even by slow walking, and correspondingly more by physical work), the rate of absorption of carbon monoxide is increased proportionately. After return to fresh air, the elimination of carbon monoxide through the lungs proceeds at a rate of 30 to 60 p.ct. reduction of the blood saturation per hour. In exhaust gas from gasoline, carbon monoxide is the only considerable toxic constituent. In exhaust gas from coal distillate (benzene, &c.), and in illuminating gas, there are found to be present certain accessory toxic substances

SCOTTISH JUNIOR GAS ASSOCIATION.

Joint Visit of the Eastern and Western District Sections to the Provan Gas-Works, Glasgow.

On Saturday last, through the kindness of the Glasgow Corporation Gas Department, the members of the Eastern and Western District Sections of the Scottish Junior Gas Association were privileged to visit the Provan Gas and Chemical Works. Interest was aroused in the visit because of the fact that at present extensions on a large scale are being carried out on the gas manufacturing plant. Three hundred gentlemen attended from both the Eastern and Western Districts; and it was noted with satisfaction that the company included a goodly proportion of seniors drawn from all parts of the West of Scotland. Mr. J. W. M'Lusky (the General Manager of the Glasgow Corporation Gas Department) was present, and received the visitors, along with his Gas Convener (Bailie Young) and the Sub-Convener (Bailie Renfor). In groups of twenty, the visitors were conducted over the gas and chemical departments of the large undertaking; and the outstanding features were fully described by the following guides: Messrs. J. Webster, D. Macdonald. F. Millen, R. Stuart Dunbar, J. Elder, C. Thyne, and R. Morrison.

Considerable time was spent at the outset in viewing the Woodall-Duckham vertical retort installation, which is the largest single vertical retort installation in the world. It consists of eight separate benches, placed in four lines, each bench comprising 24 large retorts. Each retort has a nominal capacity of 7 tons of coal per day. The producers for heating the retorts are placed at either end of each bench; the retorts being set so that each is a separate unit in itself, having individual producer gas, secondary air, and waste gas control. Each retort, therefore, can be worked independently of any adjoining retorts. The total carbonizing capacity of the plant is 1356 tons of Lanarkshire coals per day, giving an output of over 16 million c.ft. of 520 B.Th.U. gross straight gas.

Coal is brought to the plant on elevated sidings at the end of the retort-house, where the wagons are tipped at four points opposite each line of two benches. The wagon-tippers are of the electric ram type, fitted with cradles for lifting the front buffers clear of the rails, so that the wagons are tipped to such an angle as will ensure their contents being discharged by gravity alone. The receiving hoppers into which the coal is emptied feed it through coal-breakers into gravity bucket conveyors for discharging into overhead storage hoppers above the retorts. These hoppers, as well as those for the coke required for the producers, are of 48 hours' capacity; so that any Sunday labour for filling them is dispensed with.

The coke is dealt with from under the retorts by means of large skips of 3 tons capacity each, which are drawn out of the retort-house by small steam locomotives. The skips are lifted off their chassis by overhead travelling cranes, which empty them either into the hoppers placed at the end of the retort-house for delivering on to the gravity bucket conveyors for elevating to the overhead storage hoppers above the producers, or into the outside screening and storage plant. A unique feature about the handling of coal and coke to the overhead storage hoppers is that the gravity bucket conveyors are so arranged that both materials can be elevated on the same conveyors at the same time.

Each of the vertical retort-benches is provided with its own waste-heat boiler installation, so arranged that the waste gases can be either passed through the boiler or directly up the setting chimney. Each boiler is capable of generating all the steam required for its particular bench, both for the producers and steaming the retorts, and in addition a large quantity available for other purposes about the works. Steam superheaters are fitted in the inlet-flues of each boiler, as it is recognized that the chief essential of successful steaming in vertical retorts is a supply of dry hot steam.

As an indication of the large size of this plant, the following figures are interesting: Weight of steelwork, 3200 tons; weight of cast-iron work, 2200 tons; weight of firebrick material, 20,000 tons. These figures apply only to the vertical retort installation proper—namely, the work carried out by the Woodall-Duckham Company.

One of the chief points of interest in the Woodall-Duckham system is the absolute freedom of access to the retorts, both at the top and at the bottom. All charging of retorts and producers is carried out at one level; and the vertical heating flues at the sides of the retorts permit immediate inspection of the whole of the exterior of the retorts from the same level. The ample working space on the top of the setting is quickly noted; while the reduction in labour and ground space required by the use of large retorts is a claim worthy of consideration.

The order for the vertical retort contract was placed in September, 1919; and gas making was commenced in the first section in November, 1921.

The sulphate of ammonia plant at Provan consists of two units, each capable of distilling 70,000 gallons of liquor a day, containing 1 p.ct. of ammonia. The stills are 7 ft. in diameter; and each section has three gas ports fitted with sheet-metal covers with serrated edges. The preheaters—two to each unit—consist of mild-steel outer casings containing inverted U-pipes; the waste gases being on the inside of the U-pipes, and the in-going virgin liquor on the outside. The purifiers at present installed are of

the open type; but space has been left for the erection of two closed vessels. Beyond the purifiers are two sets of lime decanters. The saturators are of the open pattern, with flat tops containing three cracker-pipes; and the centrifugal is a "Watson-Laidlaw" type, with a 48-in. diameter basket. The sulphate of ammonia dryer consists of an outer mild-steel shell, to which are riveted on the inside a number of inverted truncated cones of mild steel. A steel shaft, to which discs are fastened, and which can be withdrawn at any time, runs through the centre, and is driven from below at 200 revolutions per minute.

In regard to the tar plant, the old battery of tar-stills consists of egg-ended boilers 9 ft. in diameter, 24 ft. over all. These stills take a charge of 30 tons of tar. The new tar plant consists of four 20-ton tar-stills, 11 ft. diameter, with concave bottom, having a dishing of 3 ft. The bottoms are all in one piece. Each still has its own preheater—slightly deeper than the tar-still, and of course, with a flat bottom. Caustic soda at 9 to 10 p.ct. strength is manufactured from sodium carbonates and lime. The resulting caustic soda is then agitated with oils from which it is desired to extract carbolic and cresylic acids. Sodium phenate settling to the bottom is then pumped into other vessels, and there treated with carbon dioxide, with liberation of crude carbolic and cresylic acids, and regeneration of the sodium carbonate, which is again treated with lime, to form caustic soda. The causticizing plant is of the "Door" continuous type. In connection with the carbolic and cresylic acid distillation, there are two 20-ton stills similar to the tar-stills, with the exception that in this case the dishing of the bottom is 2 ft. There is also a third still 9 ft. in diameter with a dishing of 2 ft. 9 in. This is to be used for pitching the residues from the first two stills. The refining stills proper have each a column 18 ft. high, and 2 ft. in diameter, made up of sections of mild steel in 6 ft. lengths. Each section is filled up with "Lessing" rings. The benzole house contains three stills with columns of the bubbler type, dephlegmator, condenser, &c. The stills work a charge of 4000 gallons at a time.

Before leaving the works, the visitors were entertained at tea. Mr. A. M'Donald (the President of the Eastern Section) acknowledged the kindness and hospitality shown by the Corporation Gas Committee; and Bailie Young appropriately replied.

MINING DANGERS RESEARCH BOARD

Sub-Committee on Technical Appliances.

The Secretary for Mines has, at the request of the Mining Dangers Research Board, appointed the following to act as a Sub-Committee of that Board on Technical Appliances.

Colonel W. C. BLACKETT, C.B.E., T.D., D.L., LL.D., M.Sc., M.Inst.M.E.—Chairman.
The Rt. Hon. W. BRACE, P.C.
Mr. C. P. SPARKS, C.B.E., M.Inst.C.E., M.Inst.E.E. (Consulting Engineer to the Powell Duffryn Company).
Dr. R. V. WHEELER, D.Sc., F.I.C., F.G.S., F.C.S., M.Soc.C.I. (Director of Research).
Mr. C. D. MOTTRAM, B.Sc., M.Inst.M.E. (Senior Inspector of Mines).

Mr. C. D. MOTTRAM will also act as Secretary.

Communications for the Sub-Committee may be forwarded to Mr. C. D. Mottram, County Hotel, Newcastle-on-Tyne; or the Mines Department, 46, Victoria Street, London, S.W. 1.

Wills.—Among wills recently proved is that of Mr. Isaac Carr, of Birchfield House, Widnes, who was Gas and Water Engineer to the Widnes Corporation, and a Director of several gas companies. Mr. Carr left estate of the gross value of £18,780. Mr. George Henry Holden, manufacturing chemist, of Manchester, has left £50,737.

The Smoke Nuisance and Laundry Bills.—According to Mr. Floyd W. Parsons, writing in the "Gas Age-Record," the smoke nuisance costs each Pittsburgh family, for increased laundry bills, dry-cleaning, painting, extra artificial lighting, and general cleaning, an average of about $100 per annum. One survey showed that Pittsburgh pays for its laundry work $411,000 more than Boston, $352,000 more than Buffalo, $469,000 more than Cleveland, and $592,000 more than Philadelphia. The laundry business in Pittsburgh amounts to about $3.12 *per capita* each year. In Chicago it is $3.25; Cincinnati, $3.14, and St. Louis, $3.06. Compare these costs with the city of Philadelphia, where smokeless fuel is used, and the *per capita* laundry business amounts to only $2.01. After pointing to the value of coke as a fuel in this connection, as well as on the score of efficiency—tests conducted by the University of Illinois having shown coke to be 7 p.ct. more efficient than anthracite, and 11 p.ct. more efficient than bituminous coal—the writer urges every gas man to preach the gospel of a smokeless world. Such a campaign, if undertaken seriously and with vigour, cannot fail; for it will have truth as its foundation, and health and economy as prime supports. There is not a single sound reason why coal should be burned raw. The fact that present fuel-consuming equipment has been designed and constructed to burn raw coal presents a handicap that will retard the coming revolution in fuel practices; but it affords no difficulty that cannot be overcome.

SCOTTISH JUNIOR GAS ASSOCIATION.

(WESTERN DISTRICT.)

The Seventh Meeting for the current session was held on Saturday, March 11, in the Royal Technical College, Glasgow. Mr. JAMES CUBIE (Glasgow), the President, was in the chair.

Mr. G. D. ALEXANDER (Glasgow) read a brief paper on

METER SURVEY WORK.

At the outset, the author explained that it was his intention to deal with the work of meter inspectors in its relation to a large undertaking, because the scope of such officials was somewhat different in small towns and companies. In the latter instance, the official in charge might be a man of many parts, and the methods which might be used where one individual carried out the various duties of distribution would be totally unsuited to the case of a city or a large area. Sometimes the notion appeared prevalent that anyone would do for the class of employment associated with meter survey work; but if the best results were to be expected from this side of the department, the inspector must be the best man procurable. He must have the qualifications—in some measure at least—that go towards the making of a successful business man.

Perhaps it would be of interest to those associated with the technical side of gas engineering to detail the duties of a meter inspector as they were known in large gas undertakings up to and including 1915. No one was engaged in this class of work unless he was a trained clerk; and he was never appointed to a district until he had finished a probationary period under an experienced inspector, which, of course, meant doing the whole survey under that official's tuition. The districts averaged 2100 meters, a good percentage of which were of the wet type. As time went on and exchanges became necessary, the wet meters were gradually exchanged for dry. The inspector was responsible for the passing of his own lines, such as settings and "bring-ins" of meters, stoves, and fires. In point of fact, he was acknowledged as, and expected to be, the general secretary of his own little concern. There were six surveys—three being for the "pay surveys" (to give them their official term), and three being intermediate or wet surveys. During the period to which he was particularly referring, certain survey books were in use. Furthermore, each inspector, with one or two exceptions—these being detailed to look after lines, &c.—had his district altered at the end of the financial year. Latterly, with the more general adoption of the card system in large concerns, the idea was introduced several years ago in connection with the undertaking to which he was alluding.

So far as the card system was concerned, it possessed its good and also its bad points. Perhaps even the bad points might not be in reality much if in the working of the system every detail was carefully attended to. Unless the cards were under the supervision of two or three employees responsible entirely therefor, the whole object of the system would be defeated. Those who had to do with the card system would readily appreciate this point, especially in undertakings where thousands of cards were in constant circulation. To his mind, the one great advantage of the card system over the book system was that it was not necessary to make out fresh cards yearly. This was an operation connected with the book system that annually involved a considerable amount of time.

The author went on to argue that the meter survey inspector should be regarded as the backbone of the sales department. Inspectors ought not to be changed about from district to district, because nothing engendered a feeling of suspicion among customers more than the continual changing of inspectors. On the other hand, a regular call from the same official on the same customers fostered confidence and goodwill.

In a city it was rather difficult to fix what might be considered a satisfactory minimum area for surveying, because where there was tenement property there was often a great deal of work with very little in area to show for one's labour. There were few districts in a city like Glasgow, with its high proportion of tenement property, where high-speed surveying could be kept up regularly. A large number of meters might be surveyed at the commencement of a survey when one was fresh on the job; but there were many things to be taken into account, all of which tended to prevent the maintenance of high speed. In the cities and suburban areas of cities with villa and cottage property, every district must be regarded as a problem in itself. There was one difficulty which he was sure would be apparent to all the members of the Association—he referred to the position of meters. It appeared at times as if meters were fixed so that they were well out of the reach of gas inspectors—they never seemed to be placed with the thought that they would be read regularly and with facility. When it was realized that an inspector might be carrying with him an average of 150 or 160 surveying cards, a flash-lamp, and a pen or pencil, it would be conceded that he had almost to emulate the feat of Blondin in marking the indices from certain meters. The latter were often as not in the most inaccessible positions possible. Again, it might be more of a serpent-like crawl to get to meters in some out-of-the-way corners. He had in his mind a certain street of a comparatively new property where there were probably 150 meters in all. He would rather have surveyed 100 of them twice over than the other 40 or 50. To outward appearances the houses looked very much alike; yet in three or four of the tenements

the meters were placed in narrow cupboards and as near the roof as possible. As an instance of the risk an inspector had sometimes to run because of the inaccessibility of meters, he mentioned a certain railway tunnel, the signals of which were lit by gas. To survey the meters the inspector had to walk along the permanent way from the station platform, a distance of 40 yards or so; and no indication was ever given him as to when it might be considered proper and safe to read the meters. Another instance of inaccessibility was that of a meter in a church steeple, access to which was effected by an outside iron ladder about 20 ft. high, and it was necessary to step off the ladder to a platform in order to gain access to the door in the steeple.

In regard to the vexed question of assessment, where meters were either not indicating or only partially doing so, it seemed to him there was only one person the consumers could not hoodwink, and he was the regular gas inspector operating in the district. He knew not whether or not to believe the sometimes fanciful stories that were told in such circumstances. Nine times out of ten the regular inspector would get at an equitable figure. Of course, he quite agreed that if it was possible to make an exchange of meters within a reasonably short time, then assessing was much more simple; but occasionally it happened that this was not feasible. The post of gas inspector, whether in town or country, was one that could be used in the very best interests of the concern he represented. In these days, there was a tendency to speed-up and get greater results; but the methods in operation were not altogether conducive to this end.

Passing on to venture certain suggestions for greater efficiency —ventured, he explained, as the outcome of his own experience— the author took the view that, in addition to assistant chief surveyors, there might be appointed supervisors (say) for every ten districts. Then he would prefer to ask the inspector to do his own writing, checking, and passing of accounts, instead of deputing the work to typists. A system of this kind would prove in the long run to be efficient and economical. Because of the interval between surveys, the problem frequently arose how to keep the gas inspectors fully employed all the year round. To ensure that there would be this regularity and constancy of employment, he was in favour of having one or two intermediate surveys. Combined with this, it might be advantageous to arrange classes during the "off" period where inspectors could be given an insight into the construction and maintenance of gas-meters, and generally be kept up-to-date in their knowledge of the mechanism of new gas appliances. Conditions had changed greatly within recent years, and gas-fires and appliances were in use to day which were altogether unheard of not so long ago. It appeared to him that inspectors would be glad to widen the scope of their activities, thereby enhancing their own value to the undertakings they represented. By such a course of instruction the meter inspector would be in a position to give a definite ruling on any point that might be referred to him as to the suitability or size of a meter for the work it was being called upon to perform. He might be able to detect when a meter was slowing-off, and to observe instances where meters were probably working over their capacity. Needless expense and time would be saved by such efficiency on the part of the inspectors. Instruction along the lines he had indicated, with a general supervision of the appliances in his area, would keep an official well employed during the interval between the "pay" surveys. The inspector would be enabled to develop his gifts as a gas salesman, and perhaps in this way it would be possible for him to fit himself for a post of greater responsibility in the industry.

DISCUSSION.

The PRESIDENT thought the author had given them a good idea of the magnitude of surveying work in a large undertaking. He was in sympathy with Mr. Alexander's view that a meter inspector ought to know a little more about a meter than its mere index. In this connection, the suggestion that meter inspectors should have some instruction in the mechanism of meters was a good one; and he felt certain that the majority of the members who were meter inspectors would welcome opportunities of this kind. As an Association, the Western District was working along those lines; and he was pleased to be able to tell them that the Glasgow Corporation Gas Committee, through the good offices of Mr. M'Lusky (the General Manager), agreed at their last meeting to give the members of the Association facilities for demonstrating appliances in a testing-room which the Corporation were preparing for the employees. This was a progressive movement which was working along the lines of Mr. Alexander's paper; and meter inspectors and those engaged in the manufacturing and distribution sides of the industry would benefit from the demonstrations in the testing-room.

Mr. J. M'ISAAC (Glasgow) remarked that he observed in the meeting many of those who were associated with survey departments; and no doubt they had their own views on the issues that had been raised, just as much as the author. He appreciated the point that Mr. Alexander had made as to the inaccessibility of meters, because he knew some of the corners where they had been fixed. It seemed as if certain factors and architects were determined to run full tilt against the gas department on any and every occasion; and, of course, the latter had no alternative but to place the meters in inaccessible corners. So far as domestic meters were concerned, they were pretty much in the hands of the architects of new property; but gas departments contributed to a little of the looseness themselves by an insistence on the placing of meters as near to the entrance as possible. In regard to boundary meters, he always insisted on having them as close to the boundary wall as practicable, and always on the ground if possible. Then it was most desirable to have industrial meters located very near to the main entrance of works, &c., because manufacturers, while not raising any specific objections, might not care to have meter inspectors passing in and out of their premises when work was proceeding. The time would come, no doubt, so far as industrial meters were concerned, when the general idea of placing the meters close to the main entrance, and preferably on the ground, would have universal application. Touching upon the point raised by the author as to the advantages which the survey inspector enjoyed in assessing for gas in cases where meters had slowed-down or had stopped indexing entirely, he considered it was going to create trouble with the consumer if the policy was pursued in such circumstances of always assessing on the basis of the corresponding period of the previous year. At the present time, many instances were occurring where consumers were being assessed in this way. Inquiry had elicited that many of the meters were registering correctly, but that other appliances had got out of commission. Where this happened, they had to be very careful and tactful in dealing with consumers.

Mr. LAMB (Glasgow) considered it was quite obvious, from the criticism offered by Mr. M'Isaac, that he was not fully acquainted with the methods by which the assessment was arrived at. His own experience had rather gone to show that when consumers received a small gas bill they became extravagant in the use of gas, just because the knowledge had dawned upon them that the meter was out of order. Once the new meter got on the scene, there was the inevitable complaint that it, and not the old one, was out of order. The survey inspector was the most capable official for tripping-up mistakes and anomalies in the matter of gas assessment, particularly if he was allowed to stay in a district for a lengthy period. In course of time he became more of a personal friend than anything else to the consumers, who regarded him not so much as the inspector but as the gas department.

Mr. A. WALKER (Kilbarchan) was of the opinion that there was a great deal in the suggestion Mr. Alexander had made regarding the inauguration of classes for teaching inspectors about the mechanism of meters and gas appliances generally. It was always a pity when they sent out as gas inspectors officials who could not speak authoritatively on the mechanism of appliances. It did not go down well with the consumers, and such men ought not to be on the job at all. From his own practical experience, he would not favour any suggestion that they should fix the number of meters to be surveyed in one day. It was better not to give a meter inspector too much to do, because he could himself recall occasions when he was three times at the top of a four-storey building in the course of a quarter of an hour.

Mr. JOHN MACINTYRE (Dawsholm) favoured the idea of confining an inspector to a district for some considerable period of time. Where they had that permanency in the arrangements for survey they had invariably little trouble with "moonlight flitters." He agreed that the card system might be preferable in Glasgow; but in smaller towns the book arrangement would be possibly handier and more convenient for the individual dealing with the district.

Contributions to the discussion on similar lines of thought, and all generally approving the suggestion for instructional classes for the inspectors, were made by Messrs. WISHART, HOGG, FRAZER, and BEGG (of Glasgow), and others.

Mr. G. D. ALEXANDER, the author, in replying to a few of the points raised in the discussion, said his own personal views had been asked respecting the card system. There were undoubted advantages in the system if it was properly applied. He might instance the case of the Ballahouston Hospital, in Glasgow. There the card system worked admirably. The explanation was that one man only was held responsible for its supervision and successful operation. The drawback to the system was seen most markedly in a large concern where thousands of cards were in circulation, and where anybody almost was allowed to handle them. In a large public department there was often very little privacy; and if cards were handled by a variety of people, there was not likely to be the same success as when one official was held solely responsible. He agreed with the suggestion that had been made in the course of the discussion that a book might be worked on the loose-leaf principle, but in a large undertaking he had the feeling that the disadvantages far outweighed the advantages of the card system when the latter was efficiently applied. It would be noticed that he was an advocate of the intermediate survey. In his own experience, he had found that the intermediate check exercised a wonderful check over the average consumer's consumption. If consumers found from the intermediate survey that they had been burning gas rather heavily, it checked their extravagances in this direction before the time came round for the "pay" survey.

A vote of thanks was passed to the author at the close.

Evening Star Lodge, No. 1719.

The Annual Meeting of the Lodge was held at the Freemason's Hall, London, on Wednesday last, when W. Bro. Frank Jervis was installed in the chair in succession to W. Bro. Charles Clare. Subsequently the following officers were duly appointed for the coming year:

S.W.	Bro. Frank West.
J.W.	Bro. Rae. P. Normand.
Chaplain	W. Bro. E. G. Smithard.
Treasurer	W. Bro. Cyril G. Davis.
Secretary	W. Bro. Walter T. Dunn, L.R.
Director of Ceremonies	W. Bro. A. C. Beal.
S.D.	Bro. H. L. Sheppard.
J.D.	Bro. Alfred H. Henry.
Organist	Bro. John F. Simmance.
I.G.	Bro. Edward Pilbrow.
Stewards	W. Bro. R. W. Foster, L.R. Bro. Fred G. Cockey. Bro. A. L. Croager.

Mr. David Robb, who has occupied the position of Assistant at the Hamilton Gas-Works, has now been appointed Manager.

THE KIRKE PATENT GAS-FIRED BOILER.

There has been reprinted in pamphlet form a paper read by Mr. P. St.G. Kirke, M.A., before the West of Scotland Iron and Steel Institute on "Modern Steam Generators for the Efficient Utilization of Gaseous Fuels and the Efficient Recovery of Waste Heat." In this, the author—who is a Director of Messrs. Spencer-Bonecourt, Ltd., of Parliament Mansions, Victoria Street, S.W.—makes reference to the new improved patent Spencer-Hopwood deep-nest boiler, and to the Kirke patent gas-fired boiler, in which, he said, are embodied the improvements which experience with the Bonecourt boiler has shown to be necessary. This design of boiler is based on the discovery that if such gases as coal gas, coke-oven gas, blue water gas, producer gas, or natural gas are induced into empty tubes of great length relative to their bore, together with the air theoretically required for combustion, or some 10 p.ct. in excess thereof, they can be completely burnt without being previously mixed, and the resulting products of combustion reduced to 70° C. or less above the temperature of the water in the boiler. Further, that this can be done either with natural draught or with high induced draught of 4 in. of water and over, provided that the length of the tubes is greater relatively to their bore the higher the draught adopted. The boiler in its simplest form consists of a drum traversed by a number of long empty tubes, which function as combustion chambers, as mixing chambers, and as extractors of the sensible heat remaining in the resulting products of combustion. At the inlet end of the tube is a patent gas-burner or distributor, which discharges a jet of gas into each tube, the amount of which is determined by the size of the holes from which the gas issues and the pressure of the gas in the burner; the latter being controlled by a large gas inlet valve at the bottom of the burner. The requisite air for combustion enters each tube from the atmosphere; the quantity being controlled by the amount of draught, which is varied to suit the load. Approximate fuel consumptions per pound of steam raised from and at 212° Fahr., without an economizer, are: Coke-oven gas, 2½ c.ft.; water gas, 3⅜ c.ft.; rich coal gas, 2·2 c.ft.; and poor coal gas, 2·7 c.ft. The paper also contains particulars of the two types of Kirke waste-heat boilers; and the case is cited of one fitted to a Glover-West vertical retort setting which saved sufficient fuel to pay the cost of the boiler in six to nine months.

SPLITTING OF MANTLE RING SUPPORTS.

At a recent meeting of the Manchester Section of the Society of Chemical Industry, a note on the cause of splitting of a pottery material was given by Mrs. M. B. Craven, who described the results of an investigation carried on by her during the war period with the object of developing an English ring support for the purpose of carrying incandescent mantles.

According to an abstract appearing in the "Chemical Trade Journal," the author said it had not always been found possible to make English earthenware ring supports which would withstand the action of heat as well as would those of certain German manufacture. When heated suddenly, the English ones "split off" or splintered. Chemical analysis did not reveal any difference which would account for the success of one and the failure of the other. The evidence of the chemical analysis was entirely negative. The German body had a porosity of 12·6, the inferior English 12·7, and the fairly good English body was slightly more dense.

The difference was discovered to be purely physical. The German body broke with quite a beautiful fracture, without striation. An inferior English body exhibited considerable striations; while a moderately good English body was something like the German one. In the case of the German body, the grains were quite even in size; while with the inferior English body the grains were very uneven in size. Microscopic investigations showed that the German body was somewhat badly marked with iron specks; but these did not appear to detract in any way from the effective service of the ring. The defect was, therefore, proved to be a mechanical one, due entirely to the lack of proper preparation of the English material. Possibly flint had been used in the manufacture of the English body, for the purpose of adding silica. Flint was a very difficult material to use. The Germans probably obtained a perfectly even texture by the use of kieselguhr. The striations were altogether due to bad pressing. The remedy appeared to be the substitution of kieselguhr for flint, even grinding of the materials used, and better pressing—or, to sum it up quite shortly, better potting.

Organized by the Blackburn Corporation Gas Department, a successful exhibition of gas appliances was opened in the Artillery Barracks, on Monday of last week, by the Mayor (Alderman J. Fielding). Councillor E. Hamer (the Chairman of the Gas Committee) presided, and said the purpose of the exhibition was to establish the decided advantages which were to be derived from the use of gas. The Mayor referred to the great economies which would be effected if the latest gas appliances were in general use. Each day cookery displays by gas are being arranged. The daily attendance exceeded 1000; and orders were remarkably brisk, despite trade depression. Delegates to the opening of the new gas-works, and to the "B.C.G.A." conference, were impressed with the completeness of the arrangements for the exhibition.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Expansion of Refractory Materials.

SIR,—The "JOURNAL" of the 15th inst. [p. 642] contains an account of M. Bogitch's work on the expansion of refractory materials. It should be noted that the expansion of his test-piece was measured relative to that of fused silica. The expansion of this material is only accurately known to 1000° C.; and it can therefore be used as a reference material only up to that temperature. For this reason, the results obtained here* have been reported up to 1000° C.

Considerable doubt exists as to the behaviour of fused silica at higher temperatures. Callendar states that its expansion increases rapidly from 1000° to 1400° C., and that it contracts on heating above this temperature. Shenstone gives 1200° C. as the temperature at which this contraction begins. It should be understood that Bogitch has been able to extend his measurements to 1500° C. only by ignoring these peculiarities, so that his results at high temperature may require modification when the expansion of fused silica from 1000° to 1500° C. has been examined more fully.

JOHN W. COBB.

The University, Leeds, March 23, 1922.

* See "JOURNAL," Vol. CLI., p. 184.

Cavity Flues.

SIR,—May I be allowed to say a few words in reference to the letter in your issue of the 22nd inst., over the signature of Mr. J. C. Walker, the Secretary of the "B.C.G.A.," embodying a memorandum on the above subject from Mr. H. H. Creasey? I note that Mr. Walker gives Mr. Creasey the credit of having first suggested the use of "gas-fire economy flues," and I believe I am correct in saying that Mr. Creasey claimed this distinction for himself in one of his previous articles on the subject. In 1912, on the instructions of my Chief, and by the courtesy of the South Metropolitan Gas Company's officials, I inspected an installation of gas-fires fitted by that Company at Toksowa House Hotel, Dulwich, to the order of the Architect, Mr. Eugene Beaumont, in which built-in flues were used; and shortly afterwards my Company received instructions from Mr. Beaumont for a similar installation of fires at Hendon. May I ask, was Mr. Creasey the author of the Toksowa Hotel installation? Or does he claim priority to it?

With regard to the question of the cavity flues, I am substantially in agreement with Mr. Creasey's remarks and specifications, and admit that it is risky to discharge under the eaves. It has perforce to be done sometimes when fixing geysers; but I do not like it. I am obliged to Mr. Creasey for the tip *re* condensation from coppers—forewarned is forearmed. But there is only one copper per house, possibly used only once or twice a week; and so far I have not experienced trouble of the nature mentioned.

It is in the last clause of Mr. Creasey's memorandum, however, that I am particularly interested. The object of my paper was to direct attention to the faulty practice in the methods of gas-flue construction which are going on wholesale in my Company's area, and I believe in others. I quite agree that the builders are effecting economies; but I certainly join issue with Mr. Creasey as to the benefit of the resulting business to the gas companies. While admitting that my remarks have a more local application than Mr. Creasey's (whose experience, no doubt, covers a very wide area), yet if Mr. Creasey will take a look round my Company's district I can show him scores of gas-fire flues, 6 ft. high, discharging from side walls and under eaves, and not one that discharges above the ridge of the roof as he specifies, and, as I agree, is necessary. If he takes a walk round a well-known garden suburb he will find copper flues—hundreds, possibly thousands, of them—2 ft. to 6 ft. over-all, and down draught *ad lib.*

I am glad that the "B.C.G.A." are alive to the vital importance of this business; and perhaps they will forgive my doubting the efficacy of their propaganda *re* gas-flues when I see what builders and architects are doing within ten miles of the "B.C.G.A." headquarters. We know gas men appreciate and digest it; but do the architects and builders? And can they (the "B.C.G.A.") help us to put the builders right? If so, my object will have been achieved.

North Middlesex Gas Company Showrooms,
The Broadway, Church End,
Finchley, N 3, *March* 25.

W. L. WESTBROOK.

P.S.—Since writing the above, I have spoken to Mr. Beaumont, who informs me that the plans for the Toksowa Hotel were got-out in 1910. He also mentioned that, at the City of London Tradesmen's Club dinner about nine months ago, Mr. Goodenough gave him credit as being the author of the built-in flues.—W. L. W.

Paris Gas Company's Loan.—The correspondent of the "Daily Telegraph" states that the Paris Municipal Council have just adopted the report of M. Desvaux authorizing the Paris Gas Company to contract an obligatory loan of 300,000,000 frs., at a rate of interest not exceeding 6½ p.ct., including reimbursement at a premium.

East Midland Gas-Workers' Wages.—Many thousands of gas-workers in East Midland areas, of which Nottingham is the centre, appear to be submitting with as much equanimity as the circumstances permit to the impending reduction in wages which has long been recognized as inevitable. A penny per hour is to be taken off existing rates of pay; the severity of the "cut" having been to some extent lightened by an arrangement which has been effected on behalf of the men by Mr. Arthur Hayday, M.P. As district organizer of the National Union of General Workers, and in his capacity also as Secretary of the Workmen's Section of the National Gas Federation, he has been able to secure a modification according to which a moiety of the reduction will become operative on April 1, and the remaining halfpenny on May 1. In Nottingham alone, 1500 men fall within the scope of the altered rates of pay.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

Chester Gas Bill and the Croydon Gas Bill: Presented, read the first time, and referred to the Examiners.

Ramsgate Corporation Bill: Committed.

A report from the Standing Orders Committee that the Standing Orders not complied with in respect of the petitions for the Chester Gas Bill and the Croydon Gas Bill ought to be dispensed with, and leave given to introduce the Bills, was read, and agreed to.

A petition has been deposited on behalf of the owners and occupiers of property and consumers of gas in the Urban District of Urmston against the Stretford and District Gas Board Bill.

Public Utility Companies (Capital Issues) Act, 1920.

A copy was presented of a report by the Board of Trade under the Act on application by the Hertford Gas Light Company.

SOUTH WALES ELECTRICAL POWER DISTRIBUTION COMPANY BILL.

When this Bill came before a Committee of the House of Lords, presided over by Lord Kintore, on Friday last, a petition by gas companies in South Wales was considered. The Companies concerned were the Aberdare and Aberaman Consumers' Gas Company, Brynmawr and Blaina Gas Company, Cardiff Gas Light and Coke Company, Garw and Ogmore Gas Company, Gowerton Gas Company, Llantrisant and District Gas Company, Merthyr Tydfil Gas Company, Newport (Mon.) Gas Company, Pontypool Gas and Water Company, Quaker's Yard Gas and Water Company, Ltd., and the Rhymney and Aber Valleys Gas and Water Company. The petition referred to a clause as to agreements with local authorities for the supply of energy. This clause seeks to provide that any borough or urban or rural district council who are authorized to supply energy within the Electrical Company's area of supply may enter into agreements for the supply of energy to such council, and, in pursuance of an agreement entered into under this section, may subscribe to the capital of the Company.

Mr. W. B. Clode, K.C., appeared on behalf of the petitioners, and explained to the Committee that the parties to the petition objected to the provisions of this clause merely on principle. They did not object on the ground of competition. No evidence was called in support of the petition.

The Committee, however, decided that the Bill should be allowed to proceed.

BLACKBURN CORPORATION BILL.

This Bill, the gas section of which was noticed in the "Journal" for Jan. 11 (p. 80) came last week before the Local Legislation Committee of the House of Commons, presided over by Sir William Middlebrook.

There was no opposition to the gas section. The clause granting the Corporation power to refuse a supply of gas in certain cases has been struck out, and in its place has been inserted a standard clause giving power to refuse to supply persons who have not paid gas charges in respect of the premises they have quitted, until those charges are paid. Also, the model clause dealing with the provision of a valve where high-pressure air is used has been inserted.

PORT OF LONDON AND MIDLAND RAILWAY BILL.

Altering the Position of Gas-Pipes.

This Bill was last week before a Committee of the House of Commons presided over by Sir Park Goff.

The purpose of the Bill is to authorize the Port of London Authority and the Midland Railway Company to carry out certain work at Tilbury, including the construction of a floating landing stage and the diversion of a road. A clause is contained in the Bill dealing with the alteration of water, gas, or other pipes. Under this, the Port of London Authority seek powers, in connection with the landing stage works, to alter the position of pipes and apparatus or other obstruction, making proper substituted works during any alteration, causing as little inconvenience to the owners as circumstances admit, and making reasonable compensation for damage. Notice of proposed alterations is to be given to the persons concerned at least seven days before the work is commenced. The work is to be done at the expense of the Port of London Authority, but under the superintendence of the owners of the apparatus concerned, or to the reasonable satisfaction of the engineer of the owners. The owners, however, may do the work themselves; the cost reasonably incurred in doing so being repaid by the Authority. If, however, after having given notice, the owners fail to carry out the work with due dispatch, the Authority may execute it. The clause also gives the owners of such apparatus in any road temporarily stopped-up full liberty to do repairs, replacement, &c.

A petition was deposited against the Bill by the Grays and Tilbury Gas Company, but was withdrawn on the insertion of a clause for their protection. This clause provides that, before stopping-up roads authorized to be stopped-up by the Act, the undertakers shall, at their own expense, and to the reasonable satisfaction of the Gas Company, provide and lay a gas-main connecting at each end with the mains of the Company in the portions of the roads not stopped-up. The main is to be of a quality approved by the Gas Company, of cast iron, 6 in. in diameter, except where it will be laid along a bridge over the railway, where it shall be 10 in. diameter. If the main is carried outside the bridge, it shall be a riveted steel main with expansion joints. If the undertakers divert certain existing roads in which there are mains and apparatus, they shall, at their own expense, and to the reasonable satisfaction of the Gas Company, lay mains, &c., of similar dimensions to those existing before the road ceased to be used as such, and shall give all necessary and reasonable access to such apparatus for the purpose of maintenance, &c. The mains are to be constructed to ensure a continuous flow of gas through them, and in such positions as the Gas Company shall reasonably require, and no alterations are to be made which will leave a covering of less than 2 ft. or more than 4 ft. 6 in. over any such apparatus. Reasonable particulars of proposed works are to be sent to the Gas Company twenty-one days before their commencement. The Company may do the work themselves if they so desire, the cost to be repaid by the undertakers, in accordance with the provisions of the clause dealing with the alteration of water, gas, and other pipes. Differences are to be settled by an engineer appointed, failing agreement, by the President of the Institution of Civil Engineers; and the provisions of the Arbitration Act of 1889 shall apply.

Confiscatory Gas Law in New York.

Much satisfaction is naturally felt in gas circles at the fact that the Supreme Court of the United States have unanimously declared the 80 c. gas rate fixed by the New York Statute of 1906 to be confiscatory. The Court have affirmed decrees of the District Court restraining further enforcement of this statutory rate, and ordered the excess moneys meanwhile collected over the statutory rate, under the order of the Lower Court, to be released promptly to the gas companies concerned. It now remains for the Public Service Commission of New York to fix reasonable rates in the future. "The decision," says the American Gas Association, "is of nation-wide importance as an augury of justice and fair dealing for public utilities and their industries, and should mark the end of efforts to fix gas rates rigidly in response to political clamour, and should lead to an era of impartial reasonable regulation according to the facts and the law." The decision referred to several companies; but the case of the Consolidated Gas Company of New York may be referred to as an example. In 1884 the undertaking was organized by the merging of a number of companies; and in 1906 a Law of New York was passed which required them to sell gas with an illuminating power of 22 candles, at no more than 80 c. per 1000 c.ft. For many years the Company supplied gas at the prescribed rate; but altered circumstances compelled the Company in January, 1919, to institute proceedings alleging that the statutory rate was confiscatory, that it prevented and would continue to prevent a fair return on the property used, and asking for an injunction. After a protracted hearing, it was held by the Lower Court that the prescribed rate had been confiscatory since Jan. 1, 1918, and would continue so to be. The conditions laid down were that until March 1, 1921, or until the earlier promulgation of a gas rate applicable to the Company by some competent authority of the State of New York, the Company should neither charge nor collect for the sale of gas in the City of New York more than the sum of $1.20 per 1000 c.ft.; the excess derived from sales above 80 c. to be impounded pending the result of the appeal or the fixing of a rate by a competent authority. The judgment of the Supreme Court concludes: "It seems proper to add that we do not intend by anything said herein to intimate what would have been a reasonable rate for the sale of gas under the circumstances disclosed. The 80 c. rate was confiscatory; the $1.20 maximum imposed by the Court during a specified period as a condition to the injunction was a limitation in favour of the consumers."

Reduced Gas Price at Glasgow.—The Corporation of Glasgow last week considered the minutes of the Gas Committee, and agreed to adhere to the decision of the Committee that the price of gas should be reduced by 7d. per 1000 c.ft.

More Gas Sold at Fenny Stratford.—A considerable expansion of business was reported at the annual meeting of the Fenny Stratford Gas Light and Coke Company, Ltd. New consumers have been added; and the increased sale of gas for the past year equalled 11·2 p.ct. The Chairman (Lieut.-Col. C. J. Deyns) said the Company were able, with the purchase of a small quantity of foreign coal, to maintain a supply of gas throughout the period of the miners' strike. The balance carried to profit and loss account was £2093; and £200 was placed to reserve of repair of works account. In spite of the increased sale of gas mentioned, 345 tons less coal was carbonized. The dividend was increased from 3 to 4½ p.ct.; and it was intimated that the price of gas would be reduced after the March quarter. A vote of thanks to Mr. J. Cook (Manager and Secretary) and the staff was proposed by the Chairman, who referred to the praiseworthy manner in which the former had devoted himself to the interests of the Company. He eulogized the work Mr. Cook had accomplished during the year, and pointed to the improved position of the Company which had resulted therefrom.

Finances at Hebden Bridge.—At the last meeting of the Hebden Bridge and Mytholmroyd Gas Board for the current year, Mr. A. Sutcliffe, who presided, reported upon an interview which he, the Vice-Chairman (Mr. H. Sutcliffe), and the Manager (Mr. T. H. Nield) had had with officials of the Ministry of Health with respect to certain financial aspects of the gas undertaking, and particularly in regard to the Board's application for extensive borrowing powers. The Board are nine years ahead with regard to their sinking fund provisions; and, in view of this favourable position, the Ministry of Health consented to a suspension, for a period of five years, of further payments into the redemption fund account. With regard to borrowing for immediate necessary repairs and renewals, the Ministry advised the Board to apply for short-term loans. This necessity, it was mentioned, had come about owing to the liquid assets having become exhausted; the coal dispute having cost the Board a sum of £5000. The Chairman said the interview in London had proved very fruitful; and he thought the Board could now go ahead with the undertaking. Mr. A. Sutcliffe was thanked for his services in the chair during the year.

MISCELLANEOUS NEWS.

GAS REGULATION ACT APPLICATIONS.

The following further notices have appeared in the "London Gazette" of applications to the Board of Trade under the Gas Regulation Act.

Cranleigh Gas and Coke Company, Ltd.

The maximum price now authorized in respect of the supply of gas by the undertakers is 5s. 6d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 8d. per therm

Sevenoaks Gas Company.

The maximum price now authorized in respect of the supply of gas by the undertakers is 6s. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 22d. per therm.

DECLARATIONS OF CALORIFIC POWER.

Bilston Gas Company.—450 B.Th.U. (April 1.)
British Gas Light Company (Holywell).—510 B.Th.U. (March 22.)
Clevedon Gas Company.—450 B.Th U. (March 25.)
Crowborough District Gas Company.—475 B.Th.U. (March 25.)
Luton Gas Company.—490 B.Th.U. (March 24.)
Redcar Urban District Council.—460 B.Th.U. (April 1.)
Redditch Gas Company.—475 B.Th.U. (March 22.)
Sittingbourne and District Gas Company.—475 B.Th.U. (March 31.)
Swaffham Gas Light and Coke Company.—500 B.Th.U. (March 31)
Wakefield Gas Light Company.—500 B.Th.U. (March 25.)
Whitchurch (Salop) Gas Company, Ltd.—500 B.Th.U. (March 25)

ALTERATION OF DECLARED CALORIFIC VALUE.

Tottenham District Light, Heat, and Power Company.—As from June 30, the Company will supply gas of a calorific value of 500 B.Th.U., in place of the 450 B.Th.U. at present being supplied.

GAS REGULATION ACT ORDERS.

There have been received from the Director of Gas Administration copies of the following further Orders made by the Board of Trade under section 1 of the Gas Regulation Act.

British Gas Light Company, Ltd. (Holywell).

As from the declared date, the maximum price in respect of gas supplied by the undertakers shall be 19d. per therm. (March 20.)

Chelmsford Corporation.

As from the declared date: (1) The maximum price in respect of gas supplied by the undertakers shall be 16d. per therm; and this price shall be substituted for the price of 3s. 9d. per 1000 c.ft. mentioned in section 20 (limiting price of gas) of the Chelmsford Corporation Gas Act, 1915. (2) "1·8d." shall be substituted for "9d." where it occurs in paragraph (*b*) of section 20 of the Chelmsford Corporation Gas Act, 1915.

Prepayment meter clauses are included. (March 23.)

Clevedon Gas Company.

As from the declared date, the maximum price in respect of gas supplied by the undertakers shall be 18d. per therm. (March 16.)

Crowborough District Gas Company.

After the declared date, the standard price in respect of gas supplied by the undertakers shall be 17·4d. per therm.

For the purpose of ascertaining the authorized rate of dividend, any price charged per 1000 c.ft. before the declared date shall be rendered into the equivalent price per therm by dividing it by four-and-three-fifths. (March 21.)

Haslingden Union Gas Company.

As from the declared date, the maximum price in respect of gas supplied by the undertakers shall be 19d. per therm. (March 24.)

Knutsford Light and Water Company.

After the declared date, the standard price in respect of gas supplied by the undertakers shall be 17d. per therm.

For the purpose of ascertaining the authorized rate of dividend, any price charged per 1000 c.ft. before the declared date shall be rendered into the equivalent price per therm by dividing it by four-and-one-half. (March 25.)

Lichfield Gas Company.

After the declared date, the standard prices in respect of gas supplied by the undertakers shall be 15·6d. per therm and 18d. per therm; and these prices respectively shall be substituted for the prices of 4s. and 5s. per 1000 c.ft. mentioned in section 55 (fixing standard price of gas) of the Lichfield Gas Act, 1878.

For the purpose of ascertaining the authorized rate of dividend, any price charged per 1000 c.ft. before the declared date shall be rendered into the equivalent price per therm by dividing it by five. (March 22.)

Swanage Gas Company.

As from the declared date, the maximum price in respect of gas supplied by the undertakers shall be 19·4d. per therm. (March 18.)

Wakefield Gas Light Company.

After the declared date, the standard price in respect of gas supplied by the undertakers shall be 14·4d. per therm.

For the purpose of ascertaining the authorized rate of dividend, any price charged per 1000 c.ft. before the declared date shall be rendered into the equivalent price per therm by dividing it by four-and-four-fifths.

After the declared date, "1·2d. per therm" shall be substituted for "6d. per 1000 c.ft." in the proviso to section 4 (limits of supply) of the Wakefield Gas Act, 1912.

Prepayment meter clauses are included. (March 20.)

PUBLIC LIGHTING OF FULHAM.

Powers of Charge of the Gas Light and Coke Company.

The General Purposes Committee of the Fulham Borough Council report that they have had under consideration a reference from the Electricity and Lighting Committee respecting the charges of the Gas Light and Coke Company for gas for public lighting.

It appears, they say, that on July 1 last the Company altered their charge from 4s. 8d. per 1000 c.ft. to 13·2d. per therm. The charge of 13·2d. per therm for gas of the declared calorific value of 475 B.Th.U., which is the calorific value of the gas supplied by the Company, is equivalent to 5s. 2¾d. per 1000 c ft., so that the alteration meant an increase in price of 6¾d. per 1000 c.ft., and made a difference to the Council of over £300 per annum. While increasing the price for public lighting, the Company made no increase in their price for ordinary domestic supplies. The charge for both public lighting and ordinary domestic supplies for the current quarter is exactly the same.

The Solicitor has reported that the price which the Company may charge for gas for public lighting is definitely limited by section 39 of the Scheme of Amalgamation of the London Gas Light Company with the Gas Light and Coke Company, 1883, as amended by the Gas Light and Coke Company's Act of 1914. This section as amended provides that the price to be charged by the Gas Light and Coke Company for gas for public lighting on the north side of the Thames shall not be higher per 1000 c.ft. than that for the time being charged by the South Metropolitan Gas Company. The price charged by the South Metropolitan Gas Company as from July 1, 1921, was 11·5d. per therm, and the declared calorific value of their gas was 550 B Th.U.; the corresponding price per 1000 c.ft. being 5s. 3¼d. It will be seen, therefore, that the Gas Light and Coke Company are not exceeding the limit of charge laid down by the amended section referred to. As the alteration in the Gas Company's charge made such a serious difference to the Council, the Solicitor was instructed to look further into the matter; and he has reported that section 39 of the Scheme of Amalgamation, before it was amended by the Gas Light and Coke Company's Acts of 1909 and 1914, prohibited the Company from charging a higher price per 1000 c.ft. of "16 candle" gas. The words "16 candle" were altered to "14 candle" by the Gas Light and Coke Company's Act, 1909, and ultimately repealed altogether by the Company's Act of 1914, when the illuminating power standard for the Company's gas was abolished, and the calorific power standard substituted. Parliament, however, omitted to insert any calorific standard in the amended section in place of the repealed illuminating power standard; and this omission on the part of Parliament appears to be at the root of the mischief. The Order issued by the Board of Trade under the Gas Regulation Act, 1920, authorizing the Company to charge per therm instead of per 1000 c.ft. for the gas supplied by them, contains no modification of the provisions of the amended section 39 of the Scheme of Amalgamation, but simply fixes the standard or maximum price at 15·2d. per therm.

The Electricity and Lighting Committee have been in communication with the Board of Trade, who state that, when the draft Order for the Gas Light and Coke Company was under discussion, the Corporation of the City of London asked that section 39 of the Scheme of Amalgamation should not be altered, and that none of the local authorities who made representations with regard to the draft Order raised any objection to this course. It is, the Committee say, impossible to understand why the City of London should have made this request, unless it was that they were unaware of the amendments of section 39 made by the Company's Acts of 1909 and 1914, and that they failed to appreciate the difference which the Board of Trade Order would make with regard to the charge for public lighting north of the Thames. In any case, the Board of Trade at the time of making their Order do not appear to have realized the effect of it in this respect; and the Committee consider that strong representations should be made to the Board of Trade either to amend their Order or to initiate legislation to cure the defect in the amended section 39, or, in the alternative, that the standard of calorific value should be the same both for the Gas Light and Coke Company and the South Metropolitan Gas Company.

The final recommendation was that the attention of the Board of Trade be drawn to the facts set out in the foregoing report, and that they be urged to amend their Order relating to the charges of the Gas Light and Coke Company in the manner indicated, or to initiate legislation with a view to the amendment of section 39 of the Scheme of Amalgamation of the London Gas Company with the Gas Light and Coke Company of 1883, as amended by the Gas Company's Act, 1914, so as to provide a calorific standard for the gas referred to in that section, or in the alternative that the standard of calorific value should be the same both for the Gas Light and Coke Company and the South Metropolitan Gas Company.

Gas as a Stand-By.—The General Purposes Committee of the Wandsworth Borough Council report that their attention has been drawn to the application made to the Board of Trade by the Gas Light and Coke Company for a Special Order authorizing the Company, *inter alia*, to make a minimum charge (not exceeding 25s. in any one quarter) for a supply of gas laid on for the purposes of a stand-by in premises in which there also exists a separate supply of electricity, whether for lighting or power. As they are of opinion that the authority sought by the Company would not be in the best interests of consumers, they have informed the Board of Trade that the Council object to the proposal. They have also asked the London County Council, and the members of that Council for the Borough, to support the Council's views in the matter.

BRITISH COMMERCIAL GAS ASSOCIATION.

MANCHESTER (LANCASHIRE SECTION) CONFERENCE AT BLACKBURN.

A conference promoted by the Manchester (Lancashire Section) District Committee of the British Commercial Gas Association was held in the Public Hall, Blackburn, on Wednesday last, when there was a large and representative attendance. The morning session was devoted to a consideration of a paper, by Mr. H. H. Creasey (London), on "Modern Gas Salesmanship and Successes;" and in the afternoon attention was once more directed to the evils of smoke pollution in relation to health, and the way in which the gas industry is trying to do away with these evils.

The MAYOR OF BLACKBURN (Alderman Joseph Fielding, J.P.) gave the visitors a cordial welcome. He hoped they would enjoy their visit, and that their deliberations would result in increased knowledge. He pointed out that, whereas in the past Blackburn could not meet the needs of conferences like that being held, the town was now in possession of magnificent public halls. Blackburn was keeping well in front in her municipal undertakings. He would now leave the conference in charge of Councillor Hamer, J.P. (the President).

PRESIDENT'S OPENING ADDRESS.

Councillor HAMER then took the chair, and delivered his opening address. The present district conference of the British Commercial Gas Association had, he said, a special interest to the members of the Council of Blackburn, because it was not until after the meeting held in that town in 1915 that it was decided to join the Association; and he ventured to say they had no regrets for doing so. He was sure that, after the programme before them had been gone through, they would feel proud of being among its members. Since the meeting referred to, they had all gone through very troublesome times, and, unfortunately, they lived in a world still sorely troubled and disturbed. They knew only too well the part the gas industry played during the great war; and he felt confident it would not be lacking in its efforts to assist the community in times of peace. The "B.C.G.A." came into existence ten years ago, when people both inside and outside the industry considered that gas was destined to be ousted in course of time by its younger competitor, electricity. However, there were far-seeing men at that time who never took this view, and who saw that a brilliant future was possible for the gas industry if it kept abreast of scientific invention and adopted modern methods alike of manufacture and commerce, and if, thus equipped, it made known, effectively and persistently, its many advantages to the public. They had to-day, therefore, an association promoted on these lines to defend the commercial interests of gas, to study and discuss modern methods of business development, and make known to the general public that gas had come to be regarded, not as old-fashioned, but as one of the first requisites of modern life. The work before the Association was primarily, as it had always been, to increase business and to combat competition. Never had there been a time when competition was more likely than now to be severe in the future. Gas had its old rival coal and its new rival electricity to contend with. In regard to electricity, super-stations were being erected all over the country, so that cheaper electricity could be supplied; but the gas industry must be prepared to sell light, heat, and power still cheaper, or at least as cheaply. A time might come when gas and electricity would work together in this country; but until then they would have to take care that their business was not taken from them through negligence and backwardness. During the past few years there had been a greater knowledge of the value of gas, especially for cooking and heating, which had resulted in increased sales. In Blackburn, they had had an increased consumption of gas in spite of the dull trade in the staple industry, cotton. This had been obtained by improving the supply, and then educating the consumers to the uses of gas in the home. He urged upon all the gas engineers present the necessity for making every effort to reduce the price of gas. By so doing they would assist in bringing about that revival of trade for which the whole world was so anxiously looking.

WORK AND POLICY OF THE ASSOCIATION.

The Chairman of the Executive Committee of the Association (Mr. F. W. Goodenough) being unable to be present, Mr. W. M. MASON (the Manager) described the work and policy of the Association now and in the future. Since its inception, the Association had spent £200,000 in advocacy of popularizing the uses of gas. This money had been contributed by 80 p.ct. of the gas undertakings in the country; and that it had been wisely spent, and to the advantage of the gas industry, he submitted there could be no doubt. The "B.C.G.A." was a business concern from beginning to end. It had helped the gas business, and was in a position to help it still more in combating its foes—ignorance and prejudice (medical and architectural)—by regular, constant, and truthful advertising. He was not an anti-electricity man. His view was that there was plenty of room for both gas and electricity; but as possessors of a great inheritance, and as trustees of a big business, they must make gas as live and business a concern as possible. How were they to do this? By newspaper publicity; and this could be done by a national organization much better than by scattered individual effort. As to cost, it amounted only to 1½d. per consumer per annum. National propaganda was a thing the gas industry could not afford to neglect; and the Association was a fitting and useful medium for such propaganda.

Alderman WM. KAY, J.P. (Deputy Mayor of Manchester and Chairman of the Manchester Gas Committee), submitted that it was only by such co-operation as they had in the Association, and the spending of its money cleverly and carefully, that they could get the benefits they wished to secure. Concerning their chief competitor electricity, his view was that gas people had a better business than electricity, and would have for all time. Like Mr. Mason, he was not anti-electricity, believing there was a perfect field for both. Running side by side, they might benefit the whole nation, and even the whole world. With regard to the expenditure of the Association, he affirmed, without hesitation, that there was no waste and no extravagance—every penny was well and properly spent.

Alderman WARRINGTON (Halifax) and Mr. GEORGE KEILLOR (Greenock) also spoke.

MODERN GAS SALESMANSHIP, DEVELOPMENT, AND SUCCESSES.

Mr. H. H. CREASEY, of the Gas Light and Coke Company, next read a paper which he said did not deal extensively with the theories of gas salesmanship, but was merely a short *résumé* of some methods that have been adopted, and their results.

At the first annual conference of the "B.C.G.A." at Manchester, in October, 1912, he had, he said, the privilege of reading a paper entitled "A Campaign among the Doctors," in which he set out details of what was practically the beginning of specialized salesmanship in the area of the Company which he has the honour to represent. He used the word "specialized" because, quite apart from sales development schemes, the Company's District Inspectors and their assistants are all salesmen, constantly exercising all their powers of salesmanship when dealing with the many subjects on which they come into contact with consumers. This "specialized" salesmanship practically commenced in 1908, when he was transferred from the position of District Inspector (which he had filled for a number of years), and was instructed to take-up the task of removing the prejudices against gas heating which then very largely existed among the members of the medical profession.

As a first step, the Company had just previously sent letters to every medical man in their area, emphasizing the hygienic value of gas heating, and offering to fix a gas-fire on trial, or to inspect and overhaul any already in use. This first batch of letters produced a fair number of replies, the great majority of which were simply negative, antagonistic, or sarcastic; and therefore the author was instructed to go out and endeavour to obtain converts. At the Manchester Conference, he set out the results of the campaign from 1908 to 1912; and he now gave the results from then to the end of March, 1917, including figures relating to dentists, architects, surveyors and estate agents, hospitals, and nursing homes, because the initial results of the medical campaign proved so satisfactory that consumers coming under these important headings were subsequently dealt with on the same lines.

Results from 1912-1917 (*Five Years*).
Apparatus Fixed.

—	Fires and Heaters.	Cookers.	Water-Heaters.
Doctors	6,488	1128	826
Dentists	862	145	103
Architects	1,312	228	150
Surveyors and estate agents	1,130	128	61
Hospitals	1,250	370	143
Nursing homes	423	62	44
Total	11,465	2061	1127

Percentage Using Fires.

—	Known to be Using Fires.		Possible Total per "Directory."		Percentage Using.	
	Mar., 1912.	Mar., 1917.	1912.	1917.	1912.	1917.
Doctors	2484	3287	4012	4374	62	75
Dentists	319	563	580	793	55	71
Architects	565	842	1308	1373	43	61
Surveyors and estate agents	392	866	1350	1435	29	60
Hospitals	84	126	144	162	58	77
Nursing homes	114	224	264	308	43	72

METHODS ADOPTED IN ORIGINAL CAMPAIGN.

The methods adopted up to 1917 were as follows: A simple card system (since elaborated) was adopted; and any results obtained were carefully recorded thereon. All carded consumers who were not known to be using gas-fires received a letter each autumn repeating the previous offer, and tendering the services of a representative to give advice or assistance. Where no reply to this letter was received, a follow-up letter was sent early in December. The same procedure took place in the spring of each year regarding gas water-heaters and cookers. All those who were known to be using gas-fires received letters asking whether they were satisfied, and whether the Company might fix more apparatus. These letters produced annually a large amount of extra business and a heavy crop of satisfactory replies, many of which could be used as testimonials for publicity purposes.

CESSATION OF OPERATIONS AND ITS LESSON.

Mr. Creasey went on to say the date to which he had given figures—the spring of 1917—included two-and-a-half years of the great war; and it would be realized that by that date they were finding it increasingly difficult to deal with the work. It was then decided to cease active operations, as the reduced staff of representatives had more than enough to do to carry on the ordinary business that arose without searching for more. Thus active operations ceased from 1917 until about the middle of 1921. When the situation was reviewed at the beginning of last autumn, the Company had apparently lost ground to a very serious extent. The percentage of doctors then known to be using fires was only 47, as compared with 75 when active operations ceased; and the other classes had suffered in similar proportions. Hospitals remained about the same, though their numbers and per-

centages had fluctuated a good deal during and after the war, owing to the opening and closing of those of a temporary nature.

The author said he used the words "apparently lost ground," because the serious drop in the figures was partly accounted for by the fact that the Company's records had suffered, and until these were brought up-to-date, they did not really know their actual position. There was, however, no doubt that many of the converts and satisfied gas-fire users among these special classes were killed during the war or had removed to other towns, and those who had taken their places had not yet been brought into the fold. After making all allowances, the position clearly emphasized the value of the active operations previously carried out, and the necessity for their continuation. The percentages for 1921 before the autumn would not bear comparison with those maintaining early in 1917; and they really had again to start building-up the position. Last autumn, therefore, they recommenced their letter campaign to these classes of consumers, with the result that up to the end of December they had fixed gas-fires for 339 doctors, 64 dentists, 88 architects, and 71 surveyors and estate agents, who had not previously used gas for heating.

Extension of the Company's Schemes.

Mr. Creasey next gave details of further schemes which the Company are at present carrying out, and some results connected with them. It was then arranged to turn what had been called the Medical Section into a Sales Development Section (now known as the Special Service Section); and he (the author) continued in charge of the work.

Full Knowledge should Precede Postal Campaigns.

The first principle decided upon was that the Company ought to be in possession of the following facts regarding every one of the consumers:

1.—The type of premises occupied—that is to say, residential, offices, factory, &c.

2.—For what purposes or processes could gas be used in such premises?

3.—For which of these purposes or processes is gas actually used?

4.—Are the appliances used suitable in every way for the purposes for which they were installed?

When in possession of these facts, it is obvious that any subsequent canvassing letters sent out will have 100 p.ct. chance of success.

Commencement Made with Factory Premises.

Having decided what they should know about their consumers, the Company first started putting the principle into practice in 1919, in connection with factory premises, because many of these were then being changed-over from war work to ordinary industrial work. Lists were made of the 2706 different trades that were found to exist, and against each one of these were set out the known processes for which gas could be used. The average number of gas processes which tabulated for each of the 2706 trades was seven. The Company also defined the method of applying gas to each of these processes—that is to say, what type of appliance or burner, &c., could or should be used.

Specially skilled representatives were then chosen to examine the premises, help the consumers, and possibly obtain an order. This systematic examination of factory consumers' premises the Company are still carrying out; and the information thus provided by the representatives (including among other things answers to the four questions above outlined) is recorded on suitable cards. The Company are then prepared to send the consumers the "100 p.ct. possible" business-getting letters.

When a representative discovers a new process or purpose for which gas may be used, he gives particulars on his report. It is then added to the list of processes for the particular trade in question and any others to which it can be applied. The representatives have added four basic processes to the 64 of which the Company were previously aware, and 91 materials which may be—or are being—treated by gas, in addition to the original list of 347. Up to date they have examined 3719 factories. There are now no less than seven representatives solely engaged on factory work.

Examination of Premises Extended to Other Consumers.

Similar examinations and recording of opportunities are being carried out in connection with the classes of consumers who were included in the original campaign. In the one district in which the system was in operation during last year—which covered a period of serious trade depression accompanied by other difficulties connected with the coal strike—the results proved that the scheme is immediately profitable, without taking account of its value as the basis of future work and the consolidation of existing business. The examination of 2175 premises resulted in the securing of numerous orders; and the additional consumption thereby secured was at the estimated rate of 10,500 therms per annum.

Multiple Establishments.

The Company have extended their operations in several other directions. In the large portion of London which they supply, there are many "multiple establishment" firms, having branches in several districts; and the gas apparatus at their shops would in the ordinary way be dealt with by different district inspectors, each of whom would usually be unaware of what was taking place in the other branch establishments of the same firm. A special representative has, therefore, been appointed to deal with these firms; and as he will get in touch with their chief office representative who deals with gas matters, not only will he be aware of what is taking place regarding all the branches, but if he knows of any possible improvement in the existing plant, or is able to recommend additional gas apparatus, he can discuss its adoption throughout the whole of the firm's premises, as the conditions and operations carried out in the several branches are usually standardized.

Similar arrangements have been made regarding the London County Council Schools, the Metropolitan Police, and one or two other public authorities who have premises in a number of districts.

Gas-Engines.

Any gas apparatus that is not providing its maximum efficiency, or is imperfectly maintained, is a source of danger to the industry, and is crying-out for a competitive apparatus to take its place. The Company have therefore recently re-started examining, and where necessary taking an indicator test of, consumers' gas-engines. If as a result of this examination it is found that minor repairs—such as valve adjustments—are all that are necessary to put the engine into efficient working condition, these adjustments are carried out free of charge. If anything beyond this is required, the consumer is advised; and, if he approves, a specification and estimate are submitted to him setting out the details and cost of the necessary work. This system is giving great satisfaction to consumers; and there is no doubt it has already prevented some displacements of gas-engines by other sources of power.

Mr. Creasey concluded by giving details [tabulated below] obtained during 1921 in connection with the various schemes outlined—including "Housing," which is also dealt with by the section. It is not claimed that all the results were obtained solely by canvassing or through the methods adopted; but there is no doubt a large proportion may be credited thereto. The consumer who is left to come to the gas undertaking for something he thinks he may want, is frequently a long time arriving; and the only way to increase business is to go after it.

Discussion.

Mr. Charles Wood (Bradford) acknowledged what he called the magnificent work done in London, as described by Mr. Creasey. In Bradford, they had been working in a quiet way, and were satisfied with the result. He would like Mr. Creasey to tell the meeting how many of the orders referred to would have been secured if there had been no canvassers. Some would have been obtained by advertising. Personally, he had great faith in advertising; and he did not think the money spent on canvassers was remunerative.

Mr. W. B. M'Lusky (Halifax) said they usually took London as a pattern; but in Halifax they did not canvass.

Mr. Alfred J. Harrison (Accrington) described the paper as an excellent record of good work. In Accrington, they had keen competition from electricity, and a few years ago they found themselves going back rapidly. Their first business then was not to try to increase their consumption, but to see that the commodity they were sending out was right for its particular purpose, and that the supply was good. They had now improved their works, and had raised their gas consumption to the extent of 150 million c.ft. in three years. They were successfully competing now with their rivals.

Mr. S. Meunier (Stockport) spoke of the good that had followed the employment of a lady-canvasser to call on working-class women and explain the uses of cookers and grillers. A good thing also was to send a competent man to households to investigate complaints and put right that which happened to be wrong. This service had not been charged. He was sure the policy laid down by Mr. Creasey was right. It resulted in satisfied consumers and increased consumption.

Mr. W. M. Carr (Ormskirk) said he had found that consumers looked to the gas officials for service in the matter of costs. He desired Mr. Creasey to say what the charge was in London for the various forms of apparatus they used.

Mr. Creasey, in a brief reply, said the canvassers paid for themselves. The great thing to do now was to bring down the basic price of gas. When there had been a return to sense and sanity they might begin to consider what extra privileges they could give.

LUNCHEON.

Luncheon was served in an adjacent hall—Councillor Hamer presiding. Alderman Kay proposed "The Blackburn Gas Committee," paying the Committee cordial tribute for the progress and efficiency shown in their gas undertaking. Councillor Hamer, in reply, spoke of the Committee's indebtedness to their Engineer (Mr. G. P. Mitchell). The toast of "The Visitors" was proposed by the Mayor and acknowledged by Mr. Mason. The remaining toast was "The Press," which was proposed by Mr. S. Tagg (Preston), in a speech of much humour.

Record of Results. Year ended December, 1921.

—	Cookers.	Water Heaters.	Heaters.	Lights.	Industrial Appliances.	Sundries.	Annual Consumption Estimated on a Conservative Basis.	Appliances and Lights Adjusted.	Premises Examined.
							Therms.		
Six representatives dealing with factories	168	44	596	2,000	882	181	420,000	3467	1224
Seven special representatives dealing with certain other classes of consumers	378	213	1866	540	24	218	281,300	108	1614
One district examiner	13	8	35	213	4	124	10,500	116	2175
Total	559	265	2497	2,753	910	523	712,000	3691	5013
Housing	4192	3879	3595	18,495	..	..	640,000	..	..
Grand total	4751	4144	6092	21,248	910	523	1,352,000	3691	5013

ATMOSPHERIC POLLUTION AND HEALTH.

The afternoon session, as already indicated, was occupied with a consideration of atmospheric pollution and how the evil may be reduced by gas.

The President said the movement for the systematic investigation of atmospheric pollution might be said to date from 1912, when a conference of delegates of municipal authorities and others was held. Since that time they had had several reports from the Committee then formed for the investigation of atmospheric pollution, and much valuable work had been done by securing data on the subject. In spite of the practical illustration which the coal strike offered of the country-like atmosphere which even Blackburn could enjoy when factory and household chimneys ceased to exude their clouds, the Committee had made little practical progress; and so they were content to endure the winter fogs and the smoke pall in which their town was generally ensbrouded. Why should this be? A vital factor undoubtedly was the tendency, ingrained through winters of town life, to look on a polluted atmosphere as inevitable. Of equal importance was the failure of the individual to realize how much the remedy was in his own hands, and to assume that there was no use in performing his own part unless his neighbours were compelled to do likewise. The only cure was education and propaganda which constantly insisted that the evil was individual and could only be remedied by individuals. He had always held the view that great waste had occurred and much preventable abuse had been tolerated, to the detriment of the health of our large communities, by the neglect of the most elementary safeguards and the lack of appreciation of economical methods of smoke prevention. Compulsion was, of course, possible; it had been applied with marked success in more than one American city, and he saw from the papers there was some talk of its being tried in this country. The economic advantages of carbonizing coal instead of burning it in crude form were well known. He hoped the result of the conference would be a purer atmosphere, not only in Blackburn, but in the whole of Lancashire. Mr. Mitchell had informed him that during the month of February tests had been carried out in Blackburn as to the pollution of the atmosphere, and that they had the "honour" of being placed in the second lowest class for cleanliness.

Dr. W. Allen Daley (Medical Officer of Health of Blackburn) first read a paper on "Atmospheric Pollution and Health," in the course of which he referred to the great damage done to buildings by the tarry and acid constituents of smoke. In Manchester and Salford this was calculated at £1 a head per annum. In Pittsburgh (U.S.A.) the price paid for the damage wrought to material things, apart from the effect on health, was, before the subject was effectively tackled, estimated to be, if averaged among all the inhabitants of the town, £4 a head per annum. The injurious effects on health of a smoke-polluted atmosphere might be considered from several points of view: (*a*) The injury caused by the interposition of a cloud of smoke between the health-giving rays of the sun and ourselves; (*b*) the injury caused to the lungs by the inhalation of particles of smoke; and (*c*) the more indirect, but probably quite as potent, injury to health caused by the closing of windows in an effort to keep curtains and furniture clean. The effect of gloom and smoke on those habits of cleanliness which were so essential to good health and on mental energy, might also be mentioned.

That smoke did deprive them of the sun's rays might be shown by Prof. Leonard Hill's figures. The increase in London of gas heating and cooking appliances in the ten years 1902-11 was 1,300,000—an increase which might probably be correlated with the lessened number of fogs. The average hours of sunshine during the latter five years was 1341, or 84 hours greater than during the first five; and the average number of days of fog was reduced from 27½ to 17. In Manchester during 1901-10 the amount of bright sunshine in winter was 40 p.ct. less than at Stoneyhurst. By comparing the vital statistics of smoky towns and rural districts, it was possible to obtain some measure of the tax paid in human life as a result of apathy in dealing with the smoke nuisance. The Registrar-General had calculated the expectations of life based on the mortality during 1911-12 of all the great towns and of rural districts. In Blackburn the expectation of life of a female at birth was 49·55 years; in the county boroughs of the North taken all together, it was 49 93; but in the rural districts of Norfolk and Suffolk, it was 61·03 (over eleven years more), and in Westmoreland 66·6 years (or over seventeen years more than in Blackburn). Yet the actual structure of the rural houses was no better than in the towns. The people were certainly poorer; the wages of agricultural labourers being notoriously low at that time. Further, the best and most energetic left the countryside and went to the towns. Yet there was this great difference in average length of life. The only thing in favour of the country-dweller was that he had an abundance of pure fresh air, and, taking all towns together, on the average 20 p.ct. more sunshine than the townsman. In London, from Jan. 24 until Feb. 7, 1880, there was an intense fog; and the death-rate rose from 27 per 1000 to 48. In 1892, after a fortnight of fog, it rose to 42—almost double the normal figure.

Many other instructive figures on the relationship between fogs and the death-rate were referred to by the author, who then proceeded to point out the effect of atmospheric pollution on grass and vegetables, which applied not only to the towns themselves, but to several miles round, owing to the diffusion of the smoke in the air and its carriage by the wind. For the past seven weeks, they had made accurate measurements of atmospheric pollution in Blackburn. It must be remembered that during this time only half the mills were working. The town possessed altogether 190 factory chimneys, of which 159 were attached to cotton mills. Of the 190, 92 were fitted with mechanical stokers. There were 31,800 dwelling-houses in the town, each of which had one or more chimney-stacks. There were 37,000 gas appliances for heating or cooking, and 1000 houses where electricity was used. In about twelve mills the motive power was electricity. In February the total solids deposited amounted to 18·64 metric tons per square kilometre, or 47·5 tons per square mile, on the assumption that the deposit on the apparatus was a fair index of the conditions in the square mile of which the Technical College (where the apparatus was fixed) was the centre. This appeared to indicate that, with the exception of Rochdale, Blackburn's figures were the worst.

As in all other matters, restrictive legislation must follow, and not precede, public opinion; and it was to be hoped that public opinion would be roused to the dangers of the situation by congresses such as this. As the domestic fire was such a large factor in the production of the smoke cloud, every effort must be made to substitute gas or electric fires for the ordinary coal-fire; and gas heaters and water-boilers should replace the extravagant kitchen range. In a town like Blackburn, where there was so much industrial employment of women, and so many houses were closed for the greater part of the day, gas fires and cookers would be pre-eminently suitable, and would materially reduce the smoke pollution. He was quite convinced from his own experience—and he had had six in use for many years—that the modern gas-fire was hygienic, and that deleterious gases did not escape from it into a room. The greatest step forward in the reduction of atmospheric pollution would be such a reduction in the price of gas as would popularize its use for heating purposes, and such a reduction in the price of electricity as would induce mill-owners and others to use electric power for their machinery. The use of coal subjected to low-temperature carbonization, as prepared at Barnsley, would help to solve the problem; but he was informed that this was not yet a commercial proposition—at any rate, on a large scale.

THE GAS INDUSTRY AND SMOKE ABATEMENT.

Mr. Samuel Tagg (Engineer and Manager of the Preston Gas-Works) followed with a paper on "The Contribution of the Gas Industry towards the Abatement of the Smoke Nuisance," in which he first dealt with the report of the Departmental Committee on Smoke and Noxious Vapours Abatement. The assistance which gas can render in connection with this abatement was pointed out; and then the author turned his attention to the question of coke. He said that the success of the London Coke Committee, under the guidance of Mr. E. W. L. Nicol, as Engineer and Fuel Expert, in developing fresh markets for coke had been very great; and the work of the Committee was deserving of the closest study by engineers in other parts of the country. Attention was next drawn to the research work by Dr. Margaret Fishenden on domestic heating.

From this, the author went on to say that, with the continued use of existing ranges, a reduction in domestic smoke will only be made by replacing coal wholly or in part with a solid smokeless fuel. The supply of a low-temperature coke is not at present a commercial proposition; but gas coke free from excess moisture, as obtained from vertical retorts, and broken to a suitable size, is an excellent domestic fuel when mixed with coal, and would be more extensively used if it could be easily obtained in conveniently small quantities. In some quarters there is a tendency to charge gas undertakings with lack of enterprise in not manufacturing a low-temperature coke; but until the difficulties of carbonizing are overcome, there is no inducement for them to adopt the process. Developments are, however, being followed with great interest, as it is probable that low-temperature carbonizing would be more profitable if allied to the gas-works high-temperature processes, as the gas produced at low temperatures could be fully utilized, and the coke, which is unsuited to transport over long distances, conveniently distributed.

The possibility of replacing the domestic range by central heating plants for hot-water supply and communal kitchens and wash-houses may be dismissed, because of their cost, and the natural preference for freedom and independence in the essential domestic services. As there is no immediate prospect of coal being replaced to any considerable extent by a solid smokeless fuel, the alternative is the provision of separate gas-cookers and coke or gas heated boilers. With all the points in its favour, it is not surprising that the gas-cooker is universally used; and with the recent improvements in design which have facilitated cleaning and maintenance, and raised the efficiency of the hot-plate burners (which are responsible for most of the gas consumed) by 50 p.ct. above the pre-war standard type, the gas-cooker may be expected to displace all other forms of cooking apparatus.

There are many types of gas-heated boilers designed to meet the varying needs of the home. In Lancashire towns, the gas-heated wash-boiler is rapidly displacing the less convenient coal-heated copper; and they have been generally adopted by housing authorities. Low in initial cost and simple to use, the running cost, with gas at 4s. 6d. per 1000 c.ft., does not exceed 2d. per hour; and where no other supply is available, they can be used to feed a bath, provided it is fixed on the ground floor adjacent to the boiler.

While the thermal efficiency of the best type of gas-heated boiler reaches 75 p.ct., the running cost, if any considerable volume of water is required, exceeds that of the coke or coal heated boiler; and their use under these conditions will usually be confined to providing an auxiliary supply. Tests on an independent coke-heated boiler showed this had double the efficiency of the back-boiler of the combined range; and as an open fire is available for room heating, its adoption, accompanied by a gas-cooker, in place of the coal-range, would satisfy all domestic requirements, with the use of smokeless fuel only.

The gas-appliance makers have already turned their attention to the subject, and have placed on the market coke-boilers which reveal a high standard of efficiency, as indicated by the following report by an independent authority.

> The fuel used for the purpose of the preliminary test was ordinary gas coke, broken to walnut size, of calorific power 12,750 B.Th.U. per lb. The ash content of the coke was 9·6 p.ct.; the moisture content, 0·5 p.ct.; and the volatile matter, 3·1 p.ct. A 50-gallon storage tank was used, and the inlet temperature of the water was 60° Fahr. The object of this preliminary test was to ascertain the time required to heat the boiler, the average maximum coke consumption, and the intervals at which hot baths could be provided.
>
> The fire was kindled with 2 lbs. of wood and 4 lbs. of coke, at 11.45 a.m. At 12.45, 54 gallons, at an average temperature of 122° Fahr., were drawn; and thereafter, at 15-minute intervals, sufficient hot water was drawn off to provide twelve 30-gallon baths at 100° Fahr.
>
> The average coke consumption during this period of three hours was 4 lbs. per hour, indicating that at this rate a hot bath was provided at an expenditure of 1 lb. of coke. Calculated on the

basis of the average fuel consumption during the test period, the over-all thermal efficiency of this boiler is approximately 40 p.ct.; no allowance being made for a hot towel rail having 8·5 sq. ft. of heating surface which was permanently connected to the flow pipe of the boiler.

All gas undertakings should place the advantages of this type of boiler prominently before the public, and encourage its sale as far as possible; for it is essential that fresh permanent markets should be developed to absorb the coke which it is anticipated will be produced in ever-growing quantities.

The modern gas-fire has attained a high degree of perfection; the radiation reaching 55 p.ct., with a further 20 to 25 p.ct. of heat in the form of low-temperature convection. The balance of the heat of the gas is used to carry away the products of combustion, and to assist in the proper ventilation of the room. With further reductions in the price of gas, which the industry is striving to make as rapidly as possible, the use of gas-fires will steadily increase, and further reduce the evil of domestic smoke, though conservative instincts will probably ensure the retention of the open coal-fire in the sitting-room in constant use.

An estimate of the average volume of gas used for domestic purposes in Lancashire has been prepared through the courtesy of the engineers of eleven of the principal undertakings, representing 67 p.ct. of the total sold in the county, who have returned their percentage sales as ascertained for purposes of the coal rebate in 1919. These varied from a maximum of 92 p.ct. for the coast towns, to a minimum of 63 p.ct. in industrial areas; and the mean for the eleven towns was 78·7 p.ct. The total sales for 1919 were 27.788 million c.ft.; and the proportion for domestic purposes was therefore 21,879 millions. As the total number of inhabited houses at the census of 1911 was 989 948, and the number of separate occupiers was 1,026,371, it may be assumed that the average consumption for domestic purposes is between 21,000 and 22,000 c ft. per year for all actual and potential consumers. A careful timate of the possibilities of increased use for domestic purposes gave a figure of 30,000 c ft. per occupier as the maximum for manufacturing towns substantially under present conditions; and this should displace about 20 p.ct. of the coal now used.

To illustrate the rapid increase that has taken place in recent years, the experience at Preston was referred to by Mr. Tagg. In 1909 the output in relation to population was abnormally low, mainly because no prepayment meters were in use. An examination of all accounts, excluding industrial users, gave an average of 13,232 c.ft. for 25,817 consumers; and of these 20,000 took an average of only 6000 c.ft. each. Since 1909, 16,200 prepayment meters have been fixed, 9380 being provided with cooking-stoves; and the average consumption last year for all prepayment meters was 18,246 c.ft. In addition, over 20,000 other appliances have been sold outright, at a cost of over £52,000; and the domestic sales of gas have shown an increase of 80 p.ct. during the past ten years, which has reduced the capital charges by 4½d. per 1000 c.ft.—equal to 30 p.ct. of the 1911 costs.

An increase in the domestic sales reduced the difference between the summer and the winter load. In 1891 the Preston June output was only one-fifth of the December sales; while last year the Company sent out in June one-half of the volume sold in December. The incidence of the load has an important bearing on the price of gas; but despite the improvement in the summer output, there was a difference of 6·8d. per 1000 c.ft. in the margin of profit between the minimum and maximum months last year.

The disturbance of economic conditions occasioned by the war appear to have affected the Lancashire undertakings more seriously than in other parts of the country; for while Lancashire shows an increase of 3 p.ct. in the six years since 1913, the increased sales over the rest of the country were 12 p.ct. As 75 p.ct. of the total gas sold in the county is supplied by local authorities, the importance from the national standpoint of further developing the sales of gas, and so reducing the great evils of the smoke nuisance, should inspire those responsible for the administration of gas undertakings to renewed and sustained efforts.

Councillor J. W. SUTTON (Manchester), moving a vote of thanks to the readers of the papers, expressed the view that only by educating public opinion could they hope to attain to any lessening of the evils in question.

Alderman FORREST (Blackburn) seconded the motion; and Councillor PORTER (Blackburn), supporting it, said he did not see the slightest hope of ending the smoke nuisance until our industries took sufficient thought of the value of human life.

The resolution was passed with cheers.

Mr. MASON then proposed a vote of thanks to the President and the Gas Committee, and all who had helped to make the conference a success.

This resolution was also approved with cordiality, and with it the conference ended.

Many visitors afterwards went to the Smoke Abatement Exhibition in the town.

At a later hour, Dr. C. W. Saleeby lectured on "Life and Light."

Price Reduction at Skegness.—The Skegness Urban District Council announce a reduction in the price of gas to ordinary consumers from 6s. 3d. to 5s 6d. per 1000 c.ft.; to power users, from 6s. to 5s. 3d.; and to prepayment consumers, from 7s. to 6s. 1½d. These reductions take effect from April 1.

Southend Town Council and the Leigh Gas Undertaking.—The Gas Committee of the Southend Town Council, referring to a resolution of the Council regarding negotiations with the Southend Gas Company for the sale to the Company of the Leigh gas undertaking, report that for some time past they have been in communication with the Company; and it was anticipated that before the present time they would have been in a position fully to report to the Council in the matter. This has not been possible; but the negotiations have now reached such a stage that the Committee are able to state definitely that shortly they will be brought to a conclusion.

STOKE-ON-TRENT GAS-PURCHASE SCHEME.

Arrangements have been made between the Stoke-on-Trent Corporation and the British Gas Light Company for the payment in cash of £245,000 of the purchase money in connection with the acquisition by the Corporation of the Company's Potteries undertaking. The following report on the matter was presented to the Stoke-on-Trent Town Council on Thursday last by the Gas Committee:

> At a meeting of the Sub-Committee appointed in connection with the negotiations for the purchase of the British Gas Light Company's undertaking, the Town Clerk submitted a communication from the British Gas Light Company with reference to the proposal that the shareholders should accept cash instead of stock for the whole of the purchase money, and reported on certain questions raised by the Company in connection with the transfer of the undertaking.
>
> The Town Clerk referred to clause 60 of the Gas Purchase Bill, which provides that the Corporation should, in part satisfaction of the purchase price in this matter, allow the Company the sum of £245,000 Corporation Stock, carrying interest at 6 p.ct., and redeemable at the end of fifteen years. He reported that, after lengthy negotiations with the Company on Feb. 27 and 28, they had agreed to accept the sum in cash, and that the Bill altered to this effect had been reported for third reading in the House of Lords. He also reported that he had made arrangements for the provision of the necessary money in satisfaction of this sum at bank rate—namely, 4½ p.ct. The action of the Sub-Committee was confirmed, and that of the Town Clerk was approved.

Alderman A. BROOKHOUSE, moving the adoption of the Committee's report, said that the bank had agreed to advance the necessary money at 4½ p.ct., for whatever period it was required, until the Corporation could place it on the market at that price. If it could be so placed ultimately, it would be a saving of something like £55,000 on the transaction. It was a very satisfactory conclusion. He expressed his appreciation of the able way in which the Town Clerk had handled the matter; of the goodwill shown by the British Gas Light Company in the negotiations, and of the assistance rendered by Alderman J S. Goddard (the Chairman of the Finance Committee) in the closing stages of the transaction.

Mr. W. A. COWLISHAW moved that the salary of the Town Clerk be increased by £300 per annum in recognition of his efficient services to the Corporation, and particularly of his success in the negotiations with the British Gas Light Company.

Alderman GODDARD pointed out that the increase, with which he agreed, had been somewhat irregularly brought up, and moved the matter be referred to the General Purposes Committee for consideration.

This course was agreed to.

TRADES EXHIBITION AT BIRMINGHAM.

Interesting Display of Gas Equipment.

The National Trades Exhibition at Bingley Hall, Birmingham (which was opened last week and will be continued until May 13), is rather noteworthy on account of the number of excellent trade exhibits, such as furniture, hardware, and gas equipment.

The display by the Birmingham Gas Department is of an interesting and most comprehensive character—indeed, it serves an excellent educational and propaganda purpose among domestic users of gas. Gas-heated labour-saving appliances are featured; and attention is also directed by photographs, &c., to the smoke evil, and the efforts that are being put forward to solve it. Gas fitments and appliances are shown at work in such a manner that the public are able to realize the attention which is devoted to their construction and working. In one apartment equipment, in considerable variety, is shown for cooking, heating, and for the provision of hot water. One up-to-date arrangement consists of gas-cooker, gas-fire, and gas-heated circulator; these being combined in such a manner as to dispense entirely with the old-fashioned cooking-range. Above this kitchener is an airing closet, heated by the waste heat from the apparatus below. At the side of the range is installed a gas-heated wash-boiler. In the bath-room portion of the exhibit is shown an up-to-date geyser giving an instantaneous supply of hot water for the bath; while above the wash bowl is shown another system enabling hot water to be at once available for the lavatory basin. On another part of the stand is shown an "Eagle" combination coke and gas range; and elsewhere are displayed, with much artistry, brackets, pendants, and table lamps, in the Jacobean style, as well as demonstrations by gas lighting burners as to efficiencies and consumptions. The last-named are of distinct educational value; and this may also be said of the cabinet containing specimens of the various bye-products obtained from the distillation of coal in the manufacture of coal gas.

The Parkinson Stove Company, Ltd., have a comprehensive assortment of their various manufactures of gas cooking, heating, and hot-water appliances, including the "Crown," "Holborn," and other gas-cookers, as well as the "Conrad" gas-fire and other types of proved value and durability. Geysers of various kinds, and the "New Cottage" water-heater for hot-water supply, make a strong appeal. The same may be said, too, of the firm's gas-heated steam-radiators.

Cheaper and Better Gas for Plymouth.—As from the reading of the meters last Saturday, the price of gas supplied by the Plymouth and Stonehouse Gas Company was reduced by 1d. per therm. Not only are consumers to enjoy this reduction, but from Friday next are to be supplied by the Company with a richer gas having a greater heating efficiency. The revised charges for Plymouth and Stonehouse will be 9·4d. per therm for ordinary consumption (or less than 3s. 6½d. per 1000 c.ft.), and 8 8d. per therm for engines. There will be a similar reduction for Plympton and outlying districts.

LONDON COUNTY COUNCIL AND STREET LIGHTING.

Variable Costs per Mile.

At last week's meeting of the London County Council, the following motion by Mr. Percy Harris was negatived by 66 votes to 38: "That it be referred to the Local Government, Records, and Museums Committee to consider and report (1) as to the respective cost per mile of maintaining, cleaning, and lighting streets in the City of London and the 28 Metropolitan Boroughs; (2) whether it is possible to ascertain the reason for variation in cost; and (3) whether, in considering any scheme for further equalization of rates, it would be possible to fix a standard of cost and service that would be generally applicable to the whole of London."

Mr. Harris, in submitting his motion, said that in provincial towns the question of maintaining, cleaning, and lighting the streets was a comparatively simple one. There was one common standard throughout the town, and the cost was defrayed out of a common fund. In London, however, it was a very different story. A motor bus journey from Hammersmith to the extreme east of London would take one through the areas of eight different street authorities, having a tremendous variety of standards. The difference in the lighting of main roads like Oxford Street was very marked. The cost also varied a great deal. According to the "London Statistics" for 1913-14, the cost of lighting per street mile in Bethnal Green was £101, in Westminster £389, and in the City £451. This variation was not brought home to the ratepayers by the rates, because in places like the City and Westminster, where the road cost was greatest, the rate was lowest, owing to the higher assessable value.

Mr. G. H. Hume, in reply, said it was not for the Council to interfere with what was the business of the Borough Councils. Moreover, the collection of the information required would throw an immense amount of work on the officers; and he could not ask them to undertake the responsibility. To raise the question of equalization at a time when a Royal Commission was sitting to deal with it, would be an extremely inconvenient step to take.

TRADE NOTES.

Tully Gas Plants.

Tully Gas Plants, Ltd., of Millgate, Newark-on-Trent, have received an order from Wellington for a duplicate plant of 300,000 c.ft. per day capacity.

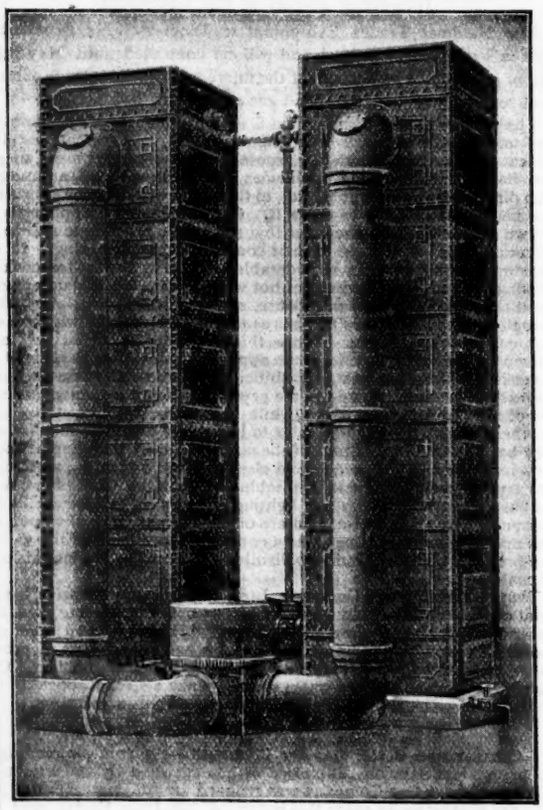
"Radiophragm" Surface Combustion.

Printed matter is to hand from Radiant Heating, Ltd, of Regent Works, Arlington Road, Camden Town, N.W., giving particulars of "Radiophragm" surface combustion (Bone and M'Court patents). With this system, a flameless fire is obtained by means of the gas and air mixture (under a suitable low pressure) being burnt on the surface of a porous brick slab, fixed into an iron back, and connected to the supply. The result is that an intense heat is obtained very economically; it being claimed that a saving is effected of 30 to 75 p.ct. over existing methods. The principal uses of the "Radiophragm" (or diaphragm) method are for evaporation of liquids by radiant heat thrown down on their surfaces; for various industrial heating operations; for the baking of biscuits and in the manufacture of various forms of confectionery; and for domestic heating operations—such as grilling, toasting, cooking, washing, drying, &c.—particularly in hotels and public institutions. The texture of the "Radiophragm" is carefully graded to suit the quality of gas employed. Mr. F. J. Cox, of Radiant Heating, Ltd., has recently given much attention to the production of diaphragms suitable to all grades of gases, and has greatly improved their manufacture. New designs are now being prepared for various fresh applications of the system. There are illustrated in the circular a griller, a boiler suitable for sugar boiling and other purposes, a water-heater, and various forms of furnaces for brass founders, drying chemicals and enamelling, glass work, &c. Muffle furnaces are constructed to any required internal dimensions for temperatures up to 2100° C.

Gas-Mantles and the Safeguarding of Industries Act.

Mr. Cyril Atkinson, K.C., the Referee under Part I. of the Safeguarding of Industries Act, has stated a case for the decision of the Courts in connection with his award in the gas-mantle case. The matter will come up before the Divisional Court on April 7. The case for the Courts has been stated at the instance of the gas-mantle manufacturers in this country, who take objection to an alteration of the wording of the Referee's decision after it was delivered, which they say leaves the position as to the real effect of the decision in considerable doubt. It is also contended that the Referee was *functus officio* after he had delivered his decision in the first place, and therefore was not entitled to alter the wording of the award. The Referee stated at the time that the alteration in wording was only intended to give effect to his intention.

Suggested Gas and Electricity Combination at Brecon.—The Town Clerk of Brecon read a letter to the Council last week from the Brecon Gas Company, stating that the local Chamber of Trade had suggested that the Company should take up the supply of electricity in the borough in addition to gas. The Directors inquired if the Corporation would support an application by the Company for electric light powers. The Corporation decided to support the application.



"BEARSCOT" TUBING IN WATER CONDENSERS EXTENDS UPWARDS OF 150 MILES.

WATER-COOLED CONDENSERS

AS FITTED WITH THE **"BEARSCOT"** SAFE JOINT TUBE.

With our Central Port Fourway Valve the Condensers may be Reversed or Bye-passed as Required.

Particulars will be supplied upon application to—

R. & J. DEMPSTER, LD.

Telegrams: "Scrubber Manchester"

MANCHESTER.

LONDON OFFICE:
34, VICTORIA STREET, WESTMINSTER, S.W.1.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *March* 27.

The London tar products market remains unaltered; there being nothing of particular interest to report. Pitch is firm at the prices last reported. Creosote is slightly improved; the price being called about 6¼d. to 6½d. per gallon. All other products are unchanged.

Tar Products in the Provinces.

March 27.

The average values for gas-works products during last week were: Gas-works coal tar, 35s. to 40s. Pitch, East Coast, 72s. 6d. to 75s. f.o.b. West Coast—Manchester, 67s. 6d. to 70s.; Liverpool, 67s. 6d. to 70s.; Clyde, 70s. to 72s. 6d. Benzole 90 p.ct. North, 2s. 1d. to 2s. 2d.; crude 65 p.ct. at 120° C., 1s. 5d. to 1s. 7d. naked at makers' works; 50-90 p.ct., naked, North, 2s. 1d. to 2s. 2d. Toluole, naked, North, 2s. 2d. to 2s. 5d. nominal. Coal tar crude naphtha in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 2s. 2d. to 2s. 4d. Heavy naphtha, North, 2s. 2d. to 2s. 4d. Creosote, in bulk, North, liquid, 4½d. to 4¾d.; salty, 4½d. to 4⅝d. Scotland, 4½d. to 4¼d. Heavy oils, in bulk, North, 6d. to 6½d. Carbolic acid, 60 p.ct., 1s. 10d. to 2s. Naphthalene, £12 to £15; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 5d. to 6d. per minimum 40 p.ct.; "B" unsaleable.

Manchester District Tar Prices.

The average price realized for the sale of tar in the Manchester district, according to the sliding-scale, for the month of January was £2 7s. 4·75d.

FROM A MARKET CORRESPONDENT.

Bye-Products Trade.

Conditions do not improve for the better, though in some instances, particularly pitch and tar, the home demand is heavier and prices continue firm. It is reported that up to 80s. per ton has been refused for pitch f.o.b. London; but the general idea seems to be in the neighbourhood of 75s. The demand for benzole is falling off. A good deal depends on the petrol market, as many people think that petrol will be much cheaper this season. There is practically no change in solvent naphtha at 2s. 8d. per gallon, though the demand is better. Refined naphthalene is not wanted, and there is only a moderate demand for lower grades at £5 to £5 10s. per ton, on account of the firelighter trade. There is not much life in carbolic acid; crude 60's being about 1s. 9d. per gallon, mostly on demand from Germany, though the English maker of crystals cannot pay this price, as he can only obtain 5d. to 5¼d. per gallon. Cresylic acid is quoted at 2s. per gallon for pale, and 1s. 9d. for dark quality. Business in intermediate products continues quiet generally. There is, however, a small amount of export inquiry; but prices are without change.

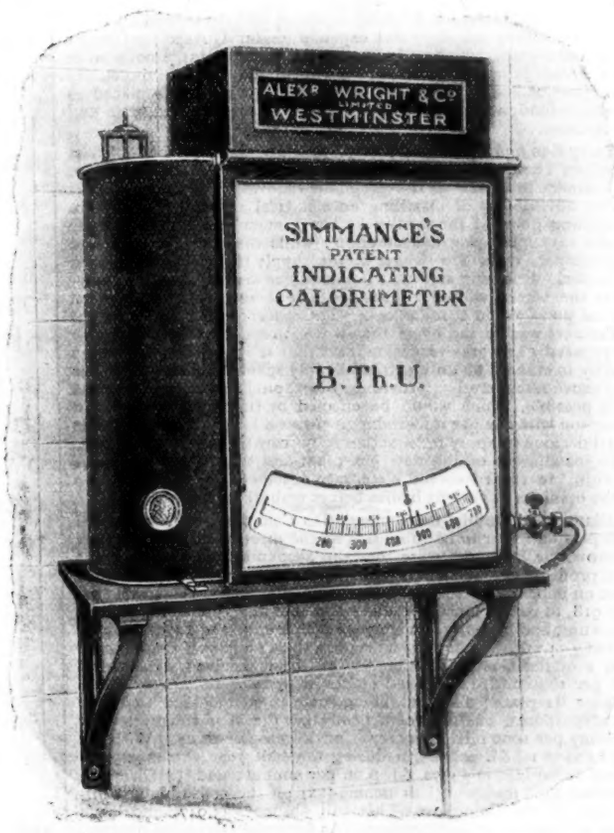
Sulphate of Ammonia.

At long last the farmer is beginning to place his orders, with the result that little material is to be had, as outputs are considerably reduced owing to the closing-down of the coke-ovens. There will be many, however, who will fail to secure their requirements this season. It will be as well if these will take to heart the lesson of procrastination, and not allow themselves to be in a similar position next year. On the other side of the Atlantic the same shortage is being experienced as over here, and any small parcels in the hands of speculators and similar people are commanding very high prices indeed—practically double the price of six months ago. The result is that both here and in the States buyers are coming into the nitrate of soda market.

A Further Reduction at Hampton Court.—In announcing that after the end of March meter readings the price of gas to private consumers will be further reduced from 13d. to 1s. per therm, the Hampton Court Gas Company state that "this Company's gas will then be the cheapest in the Southern Suburbs." They were selling gas at 5s. per 1000 c.ft. up to Christmas, and commenced this year at 13d. per therm for gas of a declared value of 450 B.Th.U.

Woking District Gas Company.—A dividend at the rate of 5 p.ct. on the "A" and "B" ordinary stocks was declared at the half-yearly meeting of the Company. The Chairman (Mr. Samuel Spencer), in moving the adoption of the report and accounts, said it was satisfactory to note that they had had a fairly good half year. Sales were over 12 p.ct. more than in the corresponding half year; but the sale of residuals had decreased by some 9 p.ct. The total revenue was £28,636, and expenses amounted to £25,461, leaving a net profit of £3174, to which had to be added the balance of £1455 brought from the last account. They were able to pay an increased dividend, as the new Order entitling them to do so came into force last December; and from then on they were hopeful that better dividends would be paid. Their standard price was 18·2d. per therm, which they considered was fair; and the declared calorific value was 450 B.Th.U. Their prospects would continue to improve. Coal, wages, and materials, the cost of which had been great during the past few years, had been considerably reduced; and there was the prospect of a further reduction, which would enable them to lower the price of gas. The consumers now numbered 1087 ordinary and 3441 prepayment; and the capital expenditure per million c.ft. of gas was down to £833. The balance-sheet showed the best results he had seen for years. He paid a high tribute to the work of Mr. B. Dennett Holroyd (the Secretary) and Mr. W. H. Ely (the Manager).

CALORIFIC POWER AT A GLANCE.



Alexander Wright
& CO., LTD.,
WESTMINSTER, S.W. 1
SOLE LICENSEES.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for March 22.]

Nos. 7267 to 7992.

Bille, L.—"Joints for pipes, &c." No. 7518.
Bodman, W. L.—"Apparatus for heating, measuring, and discharging tar, &c." No. 7836.
Brook, P. S.—"Gas-producers." No. 7796.
Brown, A.—"Lighting and extinguishing gas-lamps automatically." No. 7668.
Brown & Co., Ltd., J.—"Means for filtering blast-furnace, &c., gases." No. 7333.
Cone, E.—"Refractory linings for furnaces and production thereof." No. 7900.
Conning, J.—"Pipe wrench." No. 7581.
Cowlishaw, F. S.—"Refractory basic bricks, &c." No. 7916.
Cuthbertson, J.—"Heat-detection appliances" No. 7710.
Defays, V. J. J.—"Hot-water or steam boilers." No. 7615.
Detrick Co., M. H.—"Furnace arches." No. 7445.
Dickinson, E.—"Means for giving alarm when flow of liquid and gases through pipes, &c., fails." No. 7392.
Edmead, F.—"Automatic cut-off valve for gas, &c., supply systems." No. 7339.
Garnett, C. S.—See Cowlishaw, F. S. No. 7916.
Gettings, S. S.—See Bodman, W. L. No. 7836.
Ginger, H.—"Liquid heating or boiling apparatus." No. 7982.
Golby, F. W.—See Detrick Co., M. H. No. 7445.
Grant, A. J.—See Brown & Co., Ltd., J. No. 7333.
Greenwood, F. E. S.—See Cowlishaw, F. S No. 7916.
Gulick, E. N.—"Mechanical stoking apparatus for furnaces, &c." No. 7733.
Hale, J. W.—See Cone, E. No. 7900.
Helps, G.—"Gas-burners." No. 7669.
Helps, G.—"Cooking utensils." No. 7670.
Hodgson, J. L.—"Air and gas meters." No. 7922.
Hurrell, G. C.—"Reducing valves or gas regulators." No. 7862.
Jones, D. G.—See Brown & Co., Ltd. No. 7333.
Kerridge, H. W.—"Boilers for heating water, &c." No. 7626.
Lucas, O D.—"Retorts." No. 7941.
Lynas, J H.—"Burner for internally-heated irons." No. 7811.
Potterton, T.—See Kerridge, H. W. No. 7626.
Reid, W. A.—See Cowlishaw, F. S. No. 7916.
Streete, A.—See Edmead, F. No. 7339.
Trier, F. H.—"Connectors for pipes, &c." No. 7826.
Wolff, A. H.—"Gas heaters." No. 7426.

Advice to School Children.—The Luton Gas Company have sent to the Education Committee a book to aid teachers in the elementary schools of the town in teaching children the effect and uses of gas. The book, which is published and compiled by the British Commercial Gas Association, deals with: (1) Manufacture, distribution, and uses of gas; (2) practical applications of gas; (3) general knowledge; (4) domestic economy. The book was accepted with thanks.

Maryborough (Queensland) Gas and Coke Company, Ltd.—The profits of the Company for the half year ended Dec. 31, after making provision for depreciation, working expenses, bad debts, and all other charges (including an abnormal expenditure for Government meter testing and repairs, which will not recur for some years), amounted to £1777. After payment of the usual dividend at the rate of 6 p.ct. per annum (free of State income-tax), £200 of the balance was placed to the reserve fund, and the remaining £339 to reserve for renewals and contingencies.

Barry Gas and Electricity Proposals.—The Barry Urban District Council on Tuesday received a report prepared by Sir Charles Bright and Partners in regard to the proposed renovation of the gas-works and the advisability of installing an electrical supply for the town. The existing plant at the gas-works has become inadequate to cope with the ever-increasing consumption; while the constant repairs to the gasholders make the danger of the supply to the town failing a serious one. It is estimated that the additions and renovations necessary at the works will cost £125,000; while the installation of an electrical plant would cost £40,000. The report of Sir Charles Bright and Partners was to the effect that it was necessary to proceed with the proposed gas-works extension, and that it was desirable for the authority to embark on an electrical supply scheme. With care this would prove remunerative, providing the capital outlay were kept as low as possible, which would be effected by running the supply in conjunction with the gas undertaking. After a lengthy discussion, the Council decided to apply for sanction to borrow the amount necessary for the installation of the new gas plant and to prepare the plans forthwith. In regard to the electricity scheme, it was resolved to seek the opinions of various bodies before embarking upon it.

Alliance and Dublin Consumers' Gas Company.—In the report for the past half year to be submitted at the meeting of the Company to-morrow, the Directors state that the accounts for the six months show a profit on revenue account of £34,469; and, after providing for interest on debenture stock and temporary loans, there remains a sum of £25,918, to which must be added the sum of £5591 brought from last account, and a credit from income-tax amounting to £2701, making a total of £34,210. Since the last report, the Company's Order under section 1 of the Gas Regulation Act has been received. Instead of 3s. 7d. per 1000 c.ft., the revised standard price of 1s. 7d. per therm now takes its place; and the sliding-scale is so modified that, for dividend purposes, one-fifth of a penny per therm is substituted for each penny per 1000 c.ft. of increase or decrease of price. With the price of gas at 1s. 8d. per therm during the half year, the maximum dividend authorized is £4 7s. 6d. p.ct. per annum; and the Directors recommend such dividend (less income-tax) on the consolidated ordinary stock of the Company. This will absorb £33,947, and leave £263 to be carried to next account. As from the December quarter, the Directors were able to reduce the price of gas by 2d. per therm or 9d. per 1000 c.ft.), making the present charge 1s. 6d. per therm.

Messrs. HIGGINSON & Co.,

80, Lombard Street, London E.C. 3,

will shortly offer for subscription on behalf of

SWANSEA GAS LIGHT COMPANY

£200,000 6½ per cent. Redeemable Debenture Stock

and

£250,000 7 per cent. Redeemable Preference Stock

AT 98 PER CENT.

Under the Swansea Gas Act, 1921, the Company is authorized to charge such a price for gas as will produce the revenue necessary to pay Debenture interest, Preference dividend and dividends on its Ordinary Stock at the basic rates, namely, 5 p.ct. on the amount now outstanding and 7 p.ct. on any amount which may hereafter be issued.

Since 1861, the Company has paid the maximum authorized rate of dividend of 5 p.ct. on its Ordinary capital with the exception of the three years 1918-1920, when, owing to war conditions, the authorized rate of dividend was limited to 3¾ p.ct. per annum.

The Prospectus will be advertised early next week, and will then be obtainable from

Messrs. HIGGINSON & CO.,
80, Lombard Street, London, E.C. 3,

Messrs. ROWE & PITMAN,
Pinner's Hall, Austin Friars, E.C. 2,

and Messrs. HENRY J. THOMAS & CO.,
130, Bute Street, Cardiff.

Buxton Gas Prices.—The Buxton Corporation Gas Department announce that, after the March quarter meter readings, the price of gas will be reduced to the following rates: Lighting, 4s. 6d. per 1000 c.ft.; cooking and heating per separate meter only, 4s. 3d.; and gas-engines, 4s. A cash discount of 1d. in every complete shilling will be paid at Christmas on the three collections of June, September, and December, 1922.

Redcar and the Therm Basis.—The new method of charging for gas on the therm basis will be put into operation at Redcar on April 1. The Council have agreed to a price of 1s. 4d. per therm, and that the standard should be fixed at 460 B.Th.U. For this quality of gas the charge is equivalent to about 6s. per 1000 c.ft.; and it is calculated that, with the new Tully plant satisfactorily in operation, the Council will be able to allow a substantial discount. It was decided that, for the present quarter, during which gas has been supplied at 6s. 8d. per 1000 c.ft., a discount of 10 p.ct. should be allowed.

Luton Gas by the Therm.—It was announced by the Town Clerk at the meeting of the Luton Town Council last week that on March 10 the Board of Trade gave effect to the agreement arrived at between the Town Council and the Gas Company, whereby the new standard price of gas per therm should be 15·6d., and the Order was now in force. When negotiations were in progress, the Town Clerk said they were based on a calorific value of 480 B.Th.U.; but the Gas Company were increasing this to 490 B.Th.U. They found this was the standard of the gas supplied during recent months; and it would be maintained at that standard. Following upon the Board of Trade decision, Mr. William Phillips (the General Manager and Engineer of the Gas Company) has issued a useful little pamphlet explaining the new method of charging for gas, and, what is more interesting, an announcement of a reduction in price to ordinary consumers—from 5s. to 4s. 1d. per 1000 c.ft. The new system of charging and the reduction take effect from Saturday last.

STOCK MARKET REPORT.

THINGS on the Stock Exchange last week were generally rather quiet, and the tone at times was dull; but eventually an improvement set in, and the close was firm. The gilt-edged market was firm. Home Government issues showed increasing strength; the big four reaching high figures on Friday—viz., Consols 55-56, War Loan 97$\frac{7}{16}$-98$\frac{1}{2}$, Funding 84$\frac{1}{2}$-84$\frac{15}{16}$, Victory 85$\frac{5}{8}$-86$\frac{1}{2}$. There was a recovery in Indians.

Business in the Gas Market was a good average in point of activity, the volume of transactions being considerable and fairly distributed over the list. The tone continued of unimpaired buoyancy; all variations of quotation being in the upward direction, and some of these were of remarkable proportions. Taking them alphabetically they were as follows: Alliance and Dublin debenture 9, Brentford "A" and "B" 3, ditto preference 10, Brighton original and ordinary 5, British 1, Lea Bridge 2, Monte Video 1, Portsea Island "C" 29, Sheffield "A," "B," and "C" 1, Tottenham "B" 1. In the Continental companies, the tone was firm; Imperial, Union, and European displaying good figures. Primitiva, however, showed a slight shrinkage.

Bargains done for cash during the week were as follows: On Monday, Alliance and Dublin 62$\frac{1}{2}$, Brighton and Hove "A" 103, Commercial 3$\frac{1}{2}$ p.ct. 80$\frac{1}{2}$, Gas Light ordinary 78$\frac{1}{2}$, 78$\frac{5}{8}$, 78$\frac{3}{4}$, 79, 79$\frac{1}{2}$, ditto maximum 59, 59$\frac{1}{4}$, 59$\frac{1}{2}$, ditto preference 72, Imperial Continental 147, 147$\frac{1}{2}$, 148$\frac{1}{2}$, Primitiva 17s. 6d., ditto preference 53s. 9d., 55s, San Paulo debenture 37$\frac{1}{4}$, South Metropolitan 84$\frac{1}{4}$, 84$\frac{1}{2}$, 85$\frac{1}{2}$, South Suburban 92, Tottenham "B" 86, Liverpool 7 p.ct. preference £30 paid 33, 33$\frac{3}{4}$. On Tuesday, Alliance and Dublin 61$\frac{1}{2}$, 62, British 27, 28$\frac{1}{4}$, Commercial 4 p.ct. 80$\frac{1}{2}$, Gas Light ordinary 78$\frac{1}{2}$, 78$\frac{5}{8}$, 78$\frac{3}{4}$, 79, 79$\frac{1}{2}$, 79$\frac{3}{4}$, ditto preference 72$\frac{1}{2}$, 73$\frac{1}{2}$, 74, 74$\frac{1}{2}$, ditto debenture 57, Imperial Continental 147$\frac{1}{2}$, 148$\frac{5}{8}$, 148$\frac{1}{2}$, Lea Bridge 76$\frac{1}{2}$, Primitiva 17s., ditto preference 54s. 9d., 55s., San Paulo debenture 37$\frac{1}{2}$, Sheffield "C" 75, South Metropolitan 84$\frac{1}{2}$, 84$\frac{3}{4}$, 85, 85$\frac{1}{2}$, South Suburban 91, 91$\frac{1}{2}$, 92$\frac{1}{2}$, 93, Liverpool 7 p.ct. preference £30 paid 33, South Metropolitan 6$\frac{1}{2}$ p.ct. debenture 102$\frac{1}{2}$. On Wednesday, Alliance and Dublin 62$\frac{1}{2}$, Bombay 3$\frac{1}{2}$, Brentford "A" 90, ditto "B" 89$\frac{1}{2}$, Brighton and Hove "A" 102, 105, 105$\frac{3}{8}$, British 28$\frac{1}{2}$, Commercial 3$\frac{1}{2}$ p.ct. 81$\frac{1}{2}$, European 9$\frac{1}{2}$, Gas Light ordinary 78$\frac{1}{2}$, 78$\frac{3}{4}$, 78$\frac{5}{8}$, 78$\frac{7}{8}$, 79$\frac{1}{2}$, 79$\frac{3}{4}$, 79$\frac{5}{8}$, ditto maximum 58$\frac{3}{4}$, 59$\frac{1}{4}$, Imperial Continental 147$\frac{1}{2}$, 148$\frac{1}{2}$, 149, Liverpool 78$\frac{1}{2}$, ditto 7 p.ct. preference 102$\frac{3}{8}$, ditto £30 paid 33$\frac{3}{8}$, 33$\frac{1}{4}$, Oriental 84$\frac{1}{2}$, 85, Primitiva 16s. 6d., 16s 10$\frac{1}{2}$d., South Metropolitan 84$\frac{1}{2}$, 85, 85$\frac{1}{8}$, 85$\frac{1}{4}$, 85$\frac{3}{8}$, 85$\frac{1}{2}$, Tottenham "B" 85, 86, Guildford 68, 68$\frac{1}{2}$. On Thursday, Brentford "B" 88$\frac{1}{2}$, 89$\frac{1}{2}$, 90, ditto preference 84$\frac{1}{2}$, 85, Brighton and Hove original 150, Commercial 3$\frac{1}{2}$ p.ct. 82, Continental Union 20, Gas Light ordinary 78$\frac{1}{2}$, 78$\frac{3}{4}$, 78$\frac{7}{8}$, 79, ditto maximum 58$\frac{1}{2}$, 59$\frac{1}{4}$, ditto preference 72$\frac{1}{2}$, Hong Kong 6$\frac{1}{2}$, Imperial Continental 149, Liverpool 79$\frac{1}{2}$, Primitiva 16s. 6d., ditto preference 56s. 3d., ditto debenture 70$\frac{1}{2}$, 71, South Metropolitan 85, South Suburban debentures 79$\frac{1}{2}$, Lea Bridge 7 p.ct. debenture 101$\frac{1}{2}$, Guildford 68$\frac{1}{2}$, Southend 7 p.ct. new 60$\frac{1}{2}$. On Friday, Alliance and Dublin 61$\frac{7}{8}$, ditto debenture 58, 59, Brentford "B" 89$\frac{1}{2}$, 90, 90$\frac{1}{2}$, Brighton and Hove "A" 106, European 9, Gas Light ordinary 78$\frac{1}{2}$, 79, 79$\frac{1}{2}$, 79$\frac{3}{4}$, 79$\frac{5}{8}$, 79$\frac{7}{8}$, ditto maximum 59, Imperial Continental 148, 149, Primitiva preference 52s. 6d., 53s. 9d., South Metropolitan 85, 85$\frac{1}{2}$, 86, ditto preference 96, 96$\frac{1}{2}$, ditto 6$\frac{1}{2}$ p.ct. debenture 101$\frac{1}{2}$, Liverpool 7 p.ct. preference 103, 103$\frac{1}{2}$, ditto £30 paid 33$\frac{1}{2}$.

In the Money Market, conditions varied from day to day. Discount rates inclined the same way. Silver was fairly steady. The Bank rate is 4$\frac{1}{2}$ p.ct., as fixed on Feb. 16.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.e.					
182,049	Stk.	Mch. 15	4	4%	Aldershot 4 p.e. Pref.	...	50—55*	..
1,551,868	,,	Oct. 13	2½	3½%	Alliance & Dublin Ord.	59—64	60—65	61½—62½
374,000	,,	Jan. 12	4	4%	Do. 4 p.e. Deb.	76—79	55—60	58—59
280,000	5	Nov. 30	7½	4/-	Bombay, Ltd.	5½—6½	5½—4	3½
100,000	5	Feb. 23	16	7½%	Bournemouth Gas and Water { 5 p.e. B 7 p.e. Pref. 6 p.e. 4 p.e. Deb.	...	9—10	...
383,110	10	,,	7	7%		15—15½	8½—9	...
115,000	10	,,	6	6%		13½—14	7½—8	...
162,065	—	Dec. 30	—	4%		...	65—70	...
993,045	Stk.	Feb. 9	14	56/-	Brentford A Consolid.	261—266	87—92	90
734,920	,,	,,	11	55/-	Do. B New	204—209	87—92	88½—90½
55,000	,,	,,	5	5%	Do. 5 p.e. Pref.	109—111	80—85	84½—85
221,400	,,	Dec. 15	4	4%	Do. 4 p.e. Deb.	91—93	68—72	...
214,775	,,	Mch. 15	11	11%	Brighton & Hove Orig.	208—213	145—150*	150
244,200	,,	,,	8	8½%	Do. A Ord. Stk.	154—159	105—110*	102—106
1,287,500	Stk.	July 28	5	5%	Bristol 5 p.c. max.	...	...	...
550,000	20	Mch. 15	12½	10%	British	44—45	27—29*	27—28½
120,000	Stk.	Dec. 30	4	4%	Do. 4 p.e. Deb. Stk.	88—90	68—72	..
245,771	,,	,,	4	4%	Buenos Aires 4 p.e. Deb.	85—87	52—57	...
100,000	10	May 27	—	6%	Cape Town & Dis., Ltd.	1½—2½	6—7	...
100,000	10	Oct. 28	—	4½%	Do. 4½ p.e. Pref.	4—6	4½—5½	...
100,000	Stk.	Dec. 30	4½	4½%	Do. 4½ p.e. Deb. Stk.	70—75	58—61	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.e. Ord.	108—110	...	
1,573,280	,,	Mch. 15	5/9/4	42/8	Commercial 4 p.e. Stk.	106—108	78—83*	80½
560,000	,,	,,	5½	38/4	Do. 3½ p.e. do.	103—105	78—83*	80½—82
475,000	,,	—	3	3%	Do. 3 p.e. Deb. Stk.	69½—71½	53—58	...
800,000	,,	Dec. 15	4	—	Continental Union Ltd.	76—79	18—20	20
200,000	,,	,,	7	—	Do. 7 p.e. Pref.	115—118	33—38	...
51,600	,,	Feb. 23	15	15%	Croydon A 10 p.e.	...	185—195	...
278,400	—	,,	12	12%	Croydon B and C 7 p.e.	...	145—155	
492,270	Stk.	—	6	4½%	Derby Con. Stk.	125—125	...	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	...	...
1,002,180	10	Jan. 26	10	5/0	European, Ltd.	17½—18	8½—9½	9—9½
16,298,975	Stk.	Feb. 23	4/17/4	46/8	Gas Light and Coke { 4 p.e. Ord. 3½ p.e. max. 4 p.e. Con. Pref. 3 p.e. Con. Deb. 10 p.e. Bonds.	98—102	78—80	78½—79½
2,600,000	,,	,,	3½	35/-		76—79	57—60	58½—59½
4,062,235	,,	,,	4	4%		96—99	70—75	72—74½
4,674,850	,,	Dec. 15	3	3%		72½—74½	53—58	57
130,000	,,	Dec. 11	10	10%		...	...	
82,500	,,	Sept. 14	5	5½%	Hastings & St. h. 5 p.e.	...	...	..
258,740	,,	Mch. 15	3½	2½%	Do. 3½ p.c.	87—89	45—55*	..
70,000	10	May 12	11	5%	Hongkong & China, Ltd.	16½—16½	5½—6½	6½
86,600	Stk.	Mch. 15	9	9½%	Hornsey 7 p.e.	...	100—105*	...
131,000	,,	,,	7½	7½%	Ilford A and C	151—154	110—120*	...
65,780	,,	,,	6½	5½%	Do. B	113—118	96—101*	...
65,500	,,	Dec. 30	4	4%	Do. 4 p.e. Deb.	92—94	60—65	...
1,976,000	,,	Oct. 28	9	5%	Imperial Continental	150—160	147—152	147—149
1,235,000	,,	Feb. 9	5½	3½%	Do. 5½ p.e. Deb. Red.	84—86	67—72	...
233,941	,,	Mch. 15	6½	6½%	Lea Bridge Ord. 5 p.e.	119—121	77—82*	76½
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.e. Ords. A. B.	211—213	...	78½—79½
						146—148	...	
306,083	,,	June 26	4	4%	Do. 4 p.e. Pr. Deb. Stk.	...	...	..
165,736	,,	Feb. 23	7/5/6	6%	Maidstone 5 p.e.	...	53—55	..
63,480	,,	Dec. 30	—	3%	Do. 5 p.c. Deb.	...	43—46	..
75,000	5	June 11	6	5%	Malta & Mediterranean Met. of Melbourne { 4½ p.e. Deb.	4½—4¾	2—2½	...
250,000	100	Oct. 3	4½	4½%		99—101	93—100	...
341,930	Stk.	Nov. 30	4	4%	Monte Video, Ltd.	11½—12	57—62	...
1,875,892	,,	Feb. 23	4½	4½%	Newcastle & Gateh'd Con.	98½—99½	72—73	...
329,705	,,	Dec. 30	5½	5½%	Do. 3½ p.e. Deb.	82—83	63—65½	...
15,000	10	Aug. 26	—	7/6	North Middlesex 10 p.e.	...	12½—13	...
55,940	10	Mch. 15	7/14/0	10/1½	,, ,, 7 p.e.	14—15	8½—9½	...
300,000	Stk.	Dec. 15	8	8%	Oriental, Ltd.	117—122	84—87	84½—85
60,000	5	—	10	—	Ottoman, Ltd.	7½—7¾	2—3	...
188,120	Stk.	Dec. 30	—	6%	Plym'th & Stonch'se 5 p.c.	...	69—71	...
60,000	50	Mch. 15	13	62/6	Portsea Island, B	128—132	87—90*	...
100,000	50	,,	12	57/6	Do. C	118—122	78—83*	...
449,980	5	—	6	—	Primitiva Ord.	5½—6	½—1	16/6—17/6
499,960	5	—	5	—	Do. 5 p.e. Pref.	4½—5	2½—2¾	52/6—56/3
321,600	100	Dec. 1	4	4%	Do. 4 p.e. Deb.	91—93	70—75	70½—71
600,000	Stk.	Jan. 26	4	4%	Do. ,, ,, 1911	...	52—57	...
346,198	,,	Dec. 30	4	4%	River Plate 4 p.e. Deb.	85—87	52—57	...
150,000	10	Sept. 29	6	6%	San Paulo { 6 p.e. Pref. 5 p.e. Deb.	10½—11	6—6½	...
125,000	50	Jan. 3	5	5%		47—49	36—39	37½—37½
133,000	Stk.	Mch. 15	10	5%	Sheffield A	223—224	74—76*	...
209,984	,,	,,	10	5%	Do. B	222—224	74—76*	...
523,500	,,	,,	10	5%	Do. C	220—222	74—76*	75
133,201	Stk.	Sept. 15	4	4%	Shrewsbury 5 p.e.	...	...	...
50,000	10	Oct. 28	9	8%	South African	10½—11½	7—9	
2,609,895	Stk.	Feb. 9	5/14/0	5%	South Met. Ord.	111—113	84—86	84½—86
250,000	,,	Jan. 12	—	5%	Do. Red. Pref.	...	94—96	96—96½
4,895,443	,,	,,	3	3%	Do. 3 p.e. Deb.	72½—74½	53—58	...
224,820	,,	Feb. 23	8½	8½%	South Shields Con. Stk.	137—139	104—106	...
1,087,795	,,	,,	6	5⅞%	S'th Suburb'n Ord. 5 p.e.	114—116	87—92	91—95
368,837	,,	Dec. 30	5	5%	Do. 5 p.e. Deb. Stk.	116—118	78—83	79½
647,740	,,	Nov. 16	5	4%	Southampton Ord.	99—102	61—64	...
121,275	,,	Dec. 30	4	4%	Do. 4 p.e. Deb. Stk.	...	60—62	...
120,000	,,	Feb 23	—	7½%	Tottenham { A 5 p.e. B 3½ p.e.	135—138	88—93	...
782,275	,,	,,	6	5⅞%		115—117	81—86	85—86
181,255	,,	Dec. 15	4	4%	District { 4 p.e. Deb.	87—89	68—72	...
182,510	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	...
149,900	10	July 1	5	5%	Do. 5 p.e. Deb. Red.	93—95	45—50	...
816,476	Stk.	Mch. 15	5	5⅛%	Tynemouth 5 p.e. max.	108½—109	68—70*	...
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	Mch. 15	8½	66/3	Wandsworth A 5 p.e.	131—136	82—84*	...
255,636	,,	,,	6½	51/3	Do. B 3½ p.e.	129—134	66—69*	...
108,073	,,	,,	—	46/4½	Do. C	...	63—66*	...
140,865	,,	,,	—	46/4½	New Ordinary	...	63—66*	...
333,000	,,	,,	6½	45/-	Wimbledon 5 p.e.	117—122	63—66*	...
98,000	,,	,,	6½	50/-	Epsom 5 p.e.	121—126	63—66*	...
88,416	,,	Dec. 30	5	5%	5 p.e. Deb. Stk.	66—69	50—53	...

* Ex Div.

The Secretary of the Welsh National Exhibition announces that circumstances have arisen which make it necessary to postpone the exhibition, which was to have been held at Cardiff this year, until May-October, 1923.

Intimation has been received from the Staveley Coal and Iron Company, Ltd., that their London Office for the sale of cast-iron pipes, special castings, pig iron, &c., has been removed from Caxton House, Tothill Street, to No. 34, Victoria Street, Westminster. The telegraphic address and telephone number will remain as before.

Mr. William Phillips, who succeeded his father, the late Mr. Wm. Richard Phillips, as General Manager and Engineer of the Luton Gas Company, has signified his willingness to be identified with the Bute Hospital, Luton, as his father had been for many years. Mr. F. W. Plummer, at the annual meeting of the Hospital last week, feelingly alluded to the death of Mr. W. R. Phillips, who had been the President of the Hospital for many years. The new President (Mr. H. O. Williams), when the election of Governors on the Management Committee was being proceeded with, said that those connected with the Hospital felt they would like to see the name of Phillips continued in connection with it. Mr. Phillips was elected on the Management Committee. Mr. Phillips has also consented to continue the Vice-Presidency of the Luton and District Rifle Club, filled by his late father.

It having been decided to improve the gas supply at Portsoy, estimates are to be invited for an installation of new plant.

As will be seen from an announcement which appears elsewhere in this issue of the "Journal," Messrs. Higginson & Co., of No. 80, Lombard Street, E.C. 3, will shortly offer for subscription, on behalf of the Swansea Gas Light Company, £200,000 of 6½ p.ct. redeemable debenture stock and £250,000 7 p.ct. redeemable preference stock.

Two lives were lost in a tar-still last week, in distressing circumstances, at the Sunderland chemical works of Messrs. Brotherton & Co. The work of cleaning out the still (which was connected with others) had been in operation for some days; and when left on the previous evening, the still was free from gas of all kinds. It was with the object of removing a ladder which had remained inside that Thomas Dougherty, a fitter's labourer, went into the still. Not having returned within a reasonable time, another man went for a respirator, and summoned assistance; and an entry was made into the still. It was then found that a second man was in the still, and had also been overcome by the fumes. This man, George Rogers, a valve-man, had evidently learned of his colleague's distress; and while the rescue party were seeking respirators, had tied a handkerchief over his mouth and entered the tank. The handkerchief had not proved sufficient to prevent his asphyxiation. The two men were dispatched with all haste to the infirmary; but on arrival it was found that both were dead.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON TUESDAY, to ensure insertion in the following day's issue.

Orders to Alter or Stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Monday.

UNDISPLAYED ADVERTISEMENTS: Situations Wanted, Six Lines and under (about 36 words) 3s.; each additional Line, 6d. Situations Vacant, Apparatus Wanted and for Sale, Contracts, Public Notices, &c., 9d. per Line—minimum, 4s. 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

		ONE YEAR.		HALF-YEAR.		QUARTER.
United Kingdom	Advance Rate:	35/-	..	18/-	..	10/-
	Credit Rate:	40/-	..	21/-	..	11/6
Abroad (In the Postal Union) Payable in Advance		40/-	..	22/6	..	12/6

In payment of subscriptions for "Journals" sent abroad, Post Office Orders or Bankers' Drafts on London only are accepted.

All Communications, Remittances, &c., to be addressed to WALTER KING, LIMITED, 11, Bolt Court, Fleet Street, London, E.C. 4.

Telegrams: "GASKING, FLEET LONDON." Telephone: Holborn 6857.

OXIDE OF IRON

FOR SALE OUTRIGHT, OR ON LOAN.

SPENT OXIDE

PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LTD.,
Palmerston House,
Old Broad Street, London, E.C.2.

"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for Gas-Works.
Andrew Stephenson, Gresham House, Old Broad Street, London, E.C. "Volcanism, London."

BRITISH GAS PURIFYING MATERIAL.

ENGLISH BOG ORE AND NATURAL HYDRATED OXIDE OF IRON,
SPENT OXIDE BOUGHT.

BRITISH GAS PURIFYING MATERIALS CO., LTD.
Arcadian Gardens, Wood Green, London, N. 22.
Telegrams: "Bripurimat, Wood, London."
'Phone: Palmers Green 608.

SPENCER'S Patent Inclined HURDLE GRIDS.

THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, March 1, p. 535.

TAR WANTED.

BEFORE entering into any arrangement for the DISPOSAL of your Production will be to your interest to communicate with
BROWNHILLS CHEMICAL WORKS CO.,
near WALSALL.

WE are Buyers of Crude Gas-Works COAL TAR. If you have any for DISPOSAL, kindly communicate with
CONSTABLE, HART, AND CO., LTD.,
TAR MACADAM MANUFACTURERS,
MATLOCK.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, Oldham, and 45 & 47, Westminster Bridge Road. London, S.E. 1.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815 Oldham, and 2412 Hop, London.
Telegrams—
"Braddock, Oldham," and "Metrique, Lamb, London."

HIGH-PRESSURE DISTRIBUTION.

COMPLETE Tables for Flow of Gas in Mains, at all Pressures from ½ inch to 100 lbs.
Many other useful PRESSURE TABLES.
See "DISTRIBUTION BY STEEL" (Woodall and Parkinson), Second Edition 15s. 9d., Post Free, Benn Bros., Ltd., 8, Bouverie Street, London, E.C.4.

SULPHURIC ACID.

SPECIALLY prepared for the manufacture of SULPHATE OF AMMONIA.
SPENSER CHAPMAN & MESSEL, LTD.,
with which is amalgamated Wm. Pearce & Sons, Ltd., Mark Lane, London, E.C. Works—Silvertown.
Telegrams—"Hydrochloric, Fen, London."
Telephone—1588 Avenue (3 lines).

TULLY GAS PLANTS, LTD.,
Sole Manufacturers of
TULLY'S Patent Carburetted Hydrogen Plant.
MILLGATE, NEWARK-ON-TRENT.
London Office: 47, Victoria Street, Westminster.

MEWBURN, ELLIS, & CO.,
CHARTERED PATENT AGENTS AND TRADE MARK AGENTS,
70 & 72, Chancery Lane, London, W.C. 2.
Telegrams: "Patent, London." Phone 243 Holborn,
And 3, St. Nicholas Buildings, Newcastle-on-Tyne.

BRITISH LUX.
AN EXCELLENT PURIFYING MATERIAL
Features:—
(a) Porosity equal to Best Bog Ore.
(b) Contains Ferric Hydrate in an active state, thus resembling "Lux."
(c) Prepared in good mechanical condition ready for Purifiers.
Prices and Terms on Application to H. C. Fairlie & Co., Ltd., Falkirk.

OXIDE OF IRON.
SPENT OXIDE BOUGHT.
BALE & CHURCH, LTD.
33, St. Mary at Hill, London, E.C.3.
Phone: Minories 1484.

"TORTO" FIRE CEMENT.
BALE & CHURCH, LTD.
33, St. Mary at Hill, London, E.C.3.
Phone: Minories 1484.

"KLEENOFF," THE COOKER CLEANSER.
Tins for Sale to Consumers.
In Bulk for Works Use.
BALE & CHURCH, LTD.
33, St. Mary at Hill, London, E.C.3.
Phone: Minories 1484.

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in connection with Sulphate Plants.
We Guarantee promptness with efficiency for Repairs.
Joseph Taylor (Saturators), Ltd., Chemical Plant Engineers, Blackhorse Street Mills, Bolton.
Telegrams—"Saturators, Bolton." Telephone 848.

MOORE'S
GAS GENERATOR SYNDICATE, LTD.
COMBINED, AND SELF CONTAINED WATER AND COAL GAS PLANT.
CAPACITY, 100,000 c.ft. to 1,000,000 c.ft. per day.
1, Upper Woburn Place, London, W.C. 1.
Telegrams & Cables: "Moregasyn London."
Telephone: Museum, 7493.

GEORGE WILSON GAS METERS, Ltd for
GAS-METERS, ORDINARIES, SLOTS, AND REPAIRS,
Foleshill Road, Coventry.
Telephone: 596. Telegrams: "Gasmeter,"
and at 7/9, Grosvenor Street, C.on M., Manchester.
Telephone: 3214 City. Telegrams: "Gasmeter,"
and 46 & 47, Auckland Street, London, S.E. 11.

Continued on p. 780.